

MEETINGS HELD ON 19th FEB 2002 AND 30th FEB 2002 &
COMMUNICATED VIA UNIVERSITY LETTER NO
AC/6-418 2002-03 DATED 3rd OCTOBER 2002



**Four-Year(8-Semester)
Bachelor of Science Education Course:-
(offered by RIEM)**

*Regulations and Scheme of Studies
(Effective from 2002-2003)*



REGIONAL INSTITUTE OF EDUCATION
(National Council of Educational Research & Training)
Mysore 570 006



Integrated Semester Education Degree Courses Regulations - 2002 (B.Sc.Ed.)

Course offered and duration of the course:

B Sc Ed (8 Semesters /4 Years) offered by RIEM

Eligibility for admission to B.Sc.Ed.

Candidates seeking admission to B Sc.Ed , course must have passed the Pre-University Examination of Karnataka or any other examination recognised as equivalent thereto by the University of Mysore with 45% marks in the aggregate. However, relaxation upto 5% marks shall be given in the case of SC/ST candidates.

Further, the candidates must have passed Pre-University Examination with any of the following combinations of subjects

Physics, Chemistry, Mathematics (PCM) or Physics, Chemistry, Biology (PCB), Chemistry, Botany, Zoology (CBZ) or Physics, Mathematics, Computer Science (PMCS) or Physics, Chemistry, Mathematics, Biology (PCMB) or any other Examination equivalent thereto as recognised by the University of Mysore from time to time

Admission may be regulated through selection on the basis of marks in the qualifying examination or performance in a specially designed selection test or both and in accordance with the administrative policies relating to representation to different states in the region and reservation for certain categories like SC/ST as decided by the appropriate authorities from time to time

Scheme of Instruction

Duration of the Course and hours of instruction for different courses are given below

	B Ed (General)	B Ed (RIMSE)	B Ed (RIEM)	B Sc Ed.	B.P Ed *
D	I Semester	I - Semester	I & IV Semesters	I to VI & VIII	I - Semester
I	18 Weeks	18 Weeks	18 Weeks	Semesters	18 Weeks
R	Teaching	Teaching	Teaching	18 Weeks	Teaching
A	(36 hrs/wk)	(39 hrs/wk)		Teaching	
I	II Semester	II - Semester	II - Semester	VII - Semester	II - Semester
I	12 Weeks	12 Weeks	16 weeks Teaching	12 weeks Teaching	18 Weeks
O	Teaching	Teaching	02 weeks preinternship	06 weeks internship	Teaching
N	06 wks Practice	06 wks Practice	III - Semester		
	teaching	teaching	10 weeks Teaching		
	(32 hrs/wk)	(48 hrs/wk)	08 weeks internship		
Hrs of work week	32 + 4	32 + 23	32	32	30 + 12

Note Duration of the semester excludes examination period

**There shall be seven hours of work each day Out of which two hours shall be allotted to theory and Five hours shall be allotted to Practicals*

3.2 The syllabus of every paper shall as far as possible be divided into FIVE units

4.0 Attendance

4.1 Each semester shall be taken as a unit for purpose of calculating attendance and a student shall be considered to have put in the required attendance for the Semester, if he has attended not less than 85% of the number of working hours during each semester

4.2 Shortage of attendance up to 15% (i.e. 70% or more, but less than 85%) may be condoned by the Vice-Chancellor on the recommendations of the Principal of the College on payment of fee prescribed by the University. There shall be no condonation if attendance is below 70% during any semester, for any reason.

4.3 A candidate who does not satisfy the requirement of attendance shall not be eligible to take examination of the concerned semester, nor is eligible to get admission to the next semester

4.4 A candidate who fails to satisfy the requirement of attendance in a semester may repeat that semester in the subsequent academic year. **(This facility shall be available twice for B.Sc.Ed. in the entire course)**

4.5 If a candidate represents his/her institution/University/Karnataka State/Nation in Sports/NCC/NSS/Cultural or any Official activities, he/she is permitted to avail a maximum of 30 days in an academic year based on the recommendation of the Head of the Institution concerned. The candidate should avail such a facility only after taking prior permission of the Head of the Institution. This facility is not available to students of 2 semester / 1 year, B.Ed Courses.

5.0 Medium of Instruction:

5.1 The medium of instruction and examination shall be English

6.0 Course Structure of B.Sc.Ed. (RIEM)

FOUR-YEAR EIGHT-SEMESTER B Sc Ed. COURSE

PANORAMA OF COURSES OVER THE SEMESTERS

Sl.No	COURSE	CONTRACT HOURS PER WEEK									
		SEMESTER								TOTAL	
		I	II	III	IV	V	VI	VII	VIII		
	GENERAL EDUCATION.										
1	English	4	4	4	4	-	-	-	-		16
2	Regional Language	4	4	4	4	-	-	-	-		16
3	Health & Physical Education	2	2	-	-	-	-	-	-		4
4	Work Experience	2	2	2	-	-	-	-	-		6
5	Social Science	-	-	-	-	-	-	4	4		8
	PROFESSIONAL EDUCATION										
6	Introduction to Education	-	-	4	-	-	-	-	-		4
7	Understanding the Learner	-	-	-	4	-	-	-	-		4
8	Instruction Process and Skills	-	-	-	4	-	-	-	-		4
9	Psychology of Teaching and Learning	-	-	-	-	4	-	-	-		4
10	Curriculum and Evaluation	-	-	-	-	4	-	-	-		4
11	Instructional Media, Materials and Strategies	-	-	-	-	-	4	-	-		
12	Models of Teaching	-	-	-	-	-	4	-	-		4
13	Secondary Education in India Status, Problems	-	-	-	-	-	-	-	4		4
14	School Management	-	-	-	-	-	-	-	4		4
15	Teaching of Mathematics	-	-	-	-	4	4	4	-	15&16	12
16	Teaching Physical Science	-	-	-	-	4	4	4	-	Or	12
17	Teaching of Biological Sciences	-	-	-	-	4	4	4	-	16&17	12
18	Teaching of Computer Science	-	-	-	-	4	4	4	-	15&18 or 16&18	12
19	Internship	-	-	-	-	-	-	6wks	-		
	SUBJECT SPECIALIZATION										
20	Mathematics	6	6	6	6	6	6	6	6	O N L Y T H R E E	48
21	Computer Science TH	3	3	3	3	3	3	3	3		24
	PR	3	3	3	3	3	3	3	3		24
22	Chemistry TH	3	3	3	3	3	3	3	3		24
	PR	3	3	3	3	3	3	3	3		24
23	Physics TH	3	3	3	3	3	3	3	3		24
	PR	3	3	3	3	3	3	3	3		24
24	Botany TH	3	3	3	3	3	3	3	3		24
	PR	3	3	3	3	3	3	3	3		24
25	Zoology TH	3	3	3	3	3	3	3	3		24
	PR	3	3	3	3	3	3	3	3		24
26	Information and Communication Technology	2	2	2	-	-	-	3	3		12
	TOTAL										
		PCM	32	32	34	34	34	34	33	33	266
		CBM	32	32	34	34	34	34	33	33	266
		PM CS	32	32	34	34	34	34	33	33	266

The students who opt for Computer Science as an optional subject will not have Information and Communication Technology. However, they would work in the Computer Laboratory along with other students during the Information and Communication Technology periods

WEIGHTAGE AND CONTACT HOURS PER WEEK

Sem	Weightage (Marks)				Contact Hours per week			
	G.E.	P.E.	S.S.	Total	G.E.	P.E.	S.S.	Total
I	250	--	475	725	12	--	20	32
II	250	--	475	725	12	--	20	32
III	225	100	475	800	10	04	20	34
IV	200	200	450	850	08	08	18	34
V	--	500	450	950	--	16	18	34
VI	--	500	450	950	--	16	18	34
VII	100	600	500	1200	04	08	21	33
VIII	100	200	500	800	04	08	21	33
Total	1125	2100	3775	7000	50	60	156	266

7.0 Change of subject

7.1 Once chosen, change of subject is not permissible under any circumstances during that or subsequent semesters

8.0 Appearance for the Examination

8.1 A candidate shall apply for all the papers of a semester when he/she appears for the examination of that semester for the first time immediately after the completion of that semester

9.0 Scheme of Examination

9.1 There shall be a University Examination at the end of each semester

9.2 Detailed Scheme of Examination along with paper titles and marks break up paper-wise is as given below

B.Sc.Ed. (RIEM) Scheme

SCHEME OF EXAMINATION

Sem	Course No	Group	Subject	Max Marks				
				Theory	Sessional	Practical**	Record**	Total
I	1 1	GE	English	80	20	-	-	100
	1.2		Other Language	80	20	-	-	100
	1.3		Health & Physical Education	-	25	-	-	25
	1.4		Work Experience (ALT)	-	25	-	-	25
	1.5/1 8	SS	Mathematics/ Botany	100/80	50/20	-/40	-/10	150
	1.6/1 10		Chemistry/Computer Science*	80	20	40	10	150
	1 7/1 9		Physics/Zoology	80	20	40	10	150
	1 11		Information & Communication Technology	-	25	-	-	25
			Total	420/400	205/175	80/120	20/30	725
II	2.1	GE	English	80	20	-	-	100
	2 2		Other Language	80	20	-	-	100
	2 3		Health & Physical Education	-	25	-	-	25
	2 4		Work Experience (ALT)	-	25	-	-	25
	2 5/2.8	SS	Mathematics/Botany	100/80	50/20	-/40	-/10	150
	2.6/2 10		Chemistry/Computer Science	80	20	40	10	150
	2 7/2 9		Physics/Zoology	80	20	40	10	150
	2.11		Information and Communication Technology	-	25	-	-	25
			Total	420/400	205/175	80/120	20/30	725
III	3 1	GE	English	80	20	-	-	100
	3 2		Other Language	80	20	-	-	100
	3 3		Work Experience (ALT)	-	25	-	-	25
	3 4	PE	Introduction to Education	80	20	-	-	100
	3 5/3 8	SS	Mathematics/Botany	100/80	50/20	-/40	-/10	150
	3 6/3 10		Chemistry/Computer Science	80	20	40	10	150
	3 7/3 9		Physics/Zoology	80	20	40	10	150
	3 11		Information and Communication Technology	-	25	-	-	25
			Total	500/480	200/170	80/120	20/30	800
IV	4 1	GE	English	80	20	-	-	100
	4 2		Other Language	80	20	-	-	100
	4 3	PE	Understanding the Learner	80	20	-	-	100
	4 4		Instruction Process & Skills	80	20	-	-	100
	4 5/4.8	SS	Mathematics/Botany	100/80	50/20	-/40	-/10	150
	4 6/4.10		Chemistry/Computer Science	80	20	40	10	150
	4 7/4.9		Physics/Zoology	80	20	40	10	150
			Total	580/560	170/140	80/120	20/30	850

Sem	Course No	Group	Subject	Max Marks				
				Theory	Sessional	Practical**	Record**	Total
V	51	PI	Psychology of Teaching &	80	20	-	-	100
	52			80	20	-	-	100
	53 55			100	50	-	-	150
	54 56		Teaching of Biological Science	100	50	-	-	150
	57 510	SS	Teaching of Physical Science/ Teaching of Computer Science	100/80	50/20	-/40	-/10	150
	58 512		Mathematics/Botany	80	20	40	10	150
	59 511		Chemistry/Computer Science	80	20	40	10	150
			Physics/Zoology	80	20	40	10	150
VI	61	PI	Total	620/600	230/200	80/120	20/30	950
	62		Instructional Media, Materials and Strategy	80	20	-	-	100
	63 65		Models of Teaching	80	20	-	-	100
	64 66		Teaching of Mathematics/ Teaching of Biological Science	100	50	-	-	150
	67 610	SS	Teaching of Physical Science/ Teaching of Computer Science	100	50	-	-	150
	68 612		Mathematics/Botany	100/80	50/20	-/40	-/10	150
	69 611		Chemistry/Computer Science	80	20	40	10	150
			Physics/Zoology	80	20	40	10	150
VII	71	PI	Total	620/600	230/200	80/120	20/30	950
	72		Social Science	80	20	-	-	100
	73		Internship in Teaching - I	-	150	-	-	150
	74 75		Internship in Teaching - II	-	150	-	-	150
	76 77	SS	Teaching of Mathematics/ Teaching of Biological Science	100	50	-	-	150
	78 79		Teaching of Physical Science/ Teaching of Computer Science	100	50	-	-	150
	710 711		Mathematics/Botany	100/80	50/20	-/40	-/10	150
	712 713		Chemistry/Computer Science	80	20	40	10	150
VIII	81	PI	Physics/Zoology	80	20	40	10	150
	82		Information and Communication Technology	-	50	-	-	50
	83		Total	640/620	460/430	80/120	20/30	1200
	84 87		Social Science	80	20	-	-	100
	85 89	SS	Secondary Education in India Status, Problems and Strategies	80	20	-	-	100
	86 88		School Management	80	20	-	-	100
	810		Mathematics/Botany	100/80	50/20	-/40	-/10	150
			Chemistry/Computer Science	80	20	40	10	150
IX	91	PI	Physics/Zoology	80	20	40	10	150
	92		Information and Communication Technology	-	50	-	-	50
	93		Total	500/480	200/170	80/120	20/30	800
	94 97		Social Science	80	20	-	-	100
	95 99	SS	Secondary Education in India Status, Problems and Strategies	80	20	-	-	100
	96 98		School Management	80	20	-	-	100
	910		Mathematics/Botany	100/80	50/20	-/40	-/10	150
			Chemistry/Computer Science	80	20	40	10	150

Course in Hindi/Kannada/Malayalam/Tamil/Telugu

* Elective - Agriculture, Library Science, Technology

** Group PI - General Education, PI - Professional Education, SS - Subject Specialisation

* Computer Science is offered with Mathematics and Physics only

** Project is spread internally over the semesters

- 9.3 Duration of examination per theory paper of 60 marks shall be for 2hrs 30 minutes, and that for theory paper of 80/100 marks shall be for 3 00 hours
- 9 4 Every theory paper shall comprise of FIVE questions with internal choice covering the entire syllabus.
- 9.5 For a theory paper carrying 60 marks each full question shall carry 12 marks, with internal division of 10+2, 8+4 etc Maximum number of sub-divisions in a question shall be THREE.
For theory paper carrying 80/100 marks each full question shall carry 16/20 marks, with suitable internal divisions

10.0 Question paper setting, valuation etc.,

10 1 Question paper setting.

- (i) There shall be separate Board of Examiners for each subject for preparing, scrutinising and approving the question papers and scheme of valuation for the use at the next examination/s
- (ii) The question papers shall be drawn from the question bank, through a computer

10 2 Coding of Answer Scripts

Before valuation, the answer scripts shall be coded using false numbers For each paper code separate false number shall be given

10 3 Valuation:

- (a) There shall be single valuation of the answer scripts
- (b) In case of practical examination, average of the marks awarded by the internal and external examiners shall be taken as the final award

11.0 Photo copy, Seeing, Retotalling and Revaluation

- 11 1 A candidate who desires to apply for Photo copy of his / her theory answer script, may do so by paying prescribed fee and submitting prescribed application directly to the Registrar (Evaluation) with-in the date, as specified from time to time

- 11 2 A candidate who desires to apply for

- i) Retotalling
- ii) Seeing and Retotalling
- iii) Revaluation
- iv) Seeing and Revaluation

of his / her theory answer script, may do so by paying the prescribed fee and by submitting the prescribed application, along with the relevant original marks card, to the Registrar (Evaluation), through the Principal of the concerned college / institution, within the date as notified from time to time

Provided that there shall not be provision for only seeing

- 11.3 The retotalling shall provide for checking whether all the answers have been valued and whether the totalling is correct. In case any answer or part thereof has not been valued, that part may be referred to another valuer, and marks so awarded shall be added to the total. In case there is any mistake in totalling or carryover of marks from the inside sheets to the facing sheet, the Registrar (Evaluation) may have it corrected with the approval of the Vice-Chancellor.
- 11.4 The result of retotalling shall be announced as far possible within 15 days from the last date fixed for receipt of applications.
- 11.5 The result of revaluation shall as far as possible be announced within 40 days from the last date fixed for receipt of applications.
- 11.6 In general, revaluation shall be got done out-side the jurisdiction of the University. However, under inevitable circumstances, revaluation may be got done by an internal valuer, who has not valued that particular paper.
- 11.7
 - (a) If the difference between the original marks and the revaluation marks does not exceed 10 percent of the maximum marks prescribed for that theory paper, the average of the two marks shall be the final award.
 - (b) If the difference between the original marks and the revaluation marks is more than 10 percent of the maximum prescribed for that theory paper, such scripts shall be got valued by another external examiner. The average of the nearest two shall be the final award of marks.
 - (c) In cases where one or more answers are not valued by the original valuer, then the marks awarded by the subsequent valuer, as far as these answers are concerned, shall be taken as they are, without averaging with the marks of the other answers.
- 11.8 In cases where the difference between the original marks, first revaluation marks or/ and the second revaluation marks clearly indicate that a particular examiner has been erratic in his / her valuation, then such cases shall be referred to the "Malpractices and Lapses Inquiry committee" to establish whether or not any valuer has been erratic in his / her evaluation, and to recommend if the committee so desires, any punitive measures.
- 11.9 If there is a complaint of a serious nature, of erratic or unfair valuation in any paper for a group of candidates, the Vice-Chancellor may after a preliminary enquiry, order for **special valuation** of the concerned group of or entire set of candidates in the paper concerned. After such **special valuation**, a random sample of 10% of the answer scripts, subject to a minimum of 10, shall be referred for review.
- 11.10 The provision for gracing shall also apply to such candidates after retotalling and revaluation. However the grace marks shall be shown separately in marks ledger and not in marks card.

12.0 Classification of successful candidates

12.1 Minimum for a pass in each theory or Practical examination shall be 40%. And aggregate of theory / practical and sessional assessment of that paper shall be 40%. Aggregate of all Semesters put together shall be 50%. **There is no minimum for sessional assessment** (unless specified). However in case of 4 semester B Ed (RIE Scheme) and 8 semester B.Sc Ed Scheme, minimum for pass in Internship Teaching shall be 50%. If a candidate fails to secure minimum for pass, he / she shall repeat the semester with respect to Internship In Teaching in the subsequent year.

12.2 If a candidate passes in all papers, but secures less than 50% of marks in aggregate in a semester, the same shall be indicated in the statement of marks of that semester as **"Not Secured 50% in all papers put together"**

12.3 For declaration of First Class with distinction, First/ Second class, the aggregate of the total marks secured by a candidate (including a repeater) in all the semesters put together shall be considered as under.

75	≤	P	≤	100	First Class with Distinction
60	≤	P	<	75	First Class
50	≤	P	<	60	Second Class

Here P is the percentage of total marks secured in all the semesters of that course.

13.0 Provision for Repeaters

13.1 A candidate is allowed to carry all the previous uncleared Theory papers and Practical Units to the subsequent semester/semesters (Subject to 13.2 and 13.3 below)

13.2 Such of those candidates who have failed/remained absent and those who seek improvement in one or more theory papers in a semester, henceforth called as REPEATERS, shall appear/improve in such paper/s during the two immediate successive examinations (Subject to 13.3)

13.3 Examination for odd/even semester shall be conducted respectively at the end of odd/even semester (odd with odd, even with even)

13.4 Such of those candidates who have discontinued the course/failed to take admission to the next semester, shall get admitted to the concerned semester in the immediate next academic year only (This provision is available to a student only two times in the entire duration of the course in case the course is for more than two semesters, and only once in case of two semesters course)

13.5 If the candidate absents himself/herself from the Practical Examination, the Committee (not exceeding five teachers of the college) constituted for that examination period, by the Principal of the College, shall examine the reason for such absence and if the committee is convinced that the absence of the candidate is on valid grounds, then the committee may allow such candidates to appear for the practical examination. The list of such candidates for whom

special permission is granted or rejected, with reasons for the same shall be sent to the Registrar (Evaluation), so as to reach him within **TEN** days from the date of conduct of such examinations

13.6 The candidate shall take the examination as per the syllabus and the scheme of examination in force during the subsequent appearances

13.7 A candidate who seeks improvement has to surrender the Provisional Pass Certificate / Original Marks Card of that semester (as applicable)

13.8 Improvement is allowed only in theory and those practical / sessional paper for which minimum is prescribed. However, the marks secured in the earlier attempt shall be retained if the same is higher

13.9 A candidate is permitted to apply for improvement in any paper of the particular semester within 30 days from the date of declaration of results of that semester

14.0 Award of Grace Marks

14.1 Grace Marks shall be awarded to a paper to a maximum of 2%, if after gracing the candidate gets minimum prescribed marks and passes in that paper. The maximum grace marks for the whole examination shall not exceed 10 marks. The grace marks shall be awarded to the papers in the order of their appearance.

Note: If a paper has several components such as theory, practical, sessional etc. then the grace marks of 2% shall be calculated for all components together and shall be added to that component for which minimum is prescribed.

Regulation No 14.1

SEMESTER – I

Sessional Marks					Sessional Marks		Practical		Total			Net Ded	SM after Ded	Net Total (5)+(9) + (15)	Remarks
Max	Min	Marks Secd	Max	Marks Secd	Max	Marks Secd	Max	Marks Secd	Max	Min	Marks Scored				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
20	10	10	20	10	20	10	-	-	100	40	12	2	8	10	Passes
20	10	10	20	10	20	10	-	-	100	40	10	-	6	40	Passes
25	12	13	25	12	25	12	-	-	75	10	12	2	10	10	Passes
25	12	13	25	12	25	12	-	-	25	10	20	4	16	16	Passes
80	15	15	80	15	80	15	-	-	150	60	60	-	15	60	Passes
80	15	15	80	15	80	15	OR	OR	OR	OR	OR	-	OR	OR	Passes
20	8	8	20	8	20	8	10+10	15	150	60	60	-	8	60	Passes
20	5	5	20	5	20	5	80	19	150	60	60	-	5	60	Passes
20	5	5	20	5	20	5	10+10	-	-	-	-	-	-	-	-
20	10	10	20	10	20	10	10+10	17	150	60	57	-	10	57	Fails
25	8	8	25	8	25	8	-	-	75	10	8	-	8	8	Fails

1. The grace marks distributed to papers upto Sl No 6 is 8. Since maximum allowed grace marks is 10, for paper in Sl No 7, 3 grace can be given as the total grace adds upto 11. The paper in Sl No 8 has a maximum of 25 marks. Hence ONE grace mark can be given. But the candidate scored 2. He has fails in paper 11 of Sl No 8 and paper 17/19 of Sl No 7.

- 14.2 A candidate shall be eligible to a maximum of 5 grace marks, provided, the candidate
- appears for entire examination
 - he/she has failed in only one paper
 - passes the examination by such gracing
 - gets the minimum prescribed marks in the paper and aggregate for passing by such gracing.
- 14.3 Gracing shall also be done for the purpose of declaring classes (First Class with Distinction, First Class and Second Class) on the following guidelines.
- For an examination with a maximum of 500 marks or Less, there shall be gracing of TWO marks only
 - If the maximum marks prescribed for an examination is more than 500 marks, every unit of 500 marks or part thereof shall be graced by ONE mark. However, such gracing shall not exceed FOUR marks in all
 - This provision is applicable only in the last(Final) semester examination of any course

Regulation No.14.3

Course	Maximum Marks	II Class	I Class	I Class with Distinction	Max. Grace Marks
B Ed General	1300	650	780	975	4
B Ed RIMSE	1550	775	930	1162.5	4
B Ed RIEM	2200	1100	1320	1650	4
B Sc Ed RIE	7000	3500	4200	5250	4
BPED	1200	600	720	900	4

- 14.4 Gracing under 14.1 & 14.2 shall not be applied simultaneously for the same candidate in any examination
- 14.5 Grace marks awarded for making up of deficiency in a paper/s of a semester, shall be deducted first from out of the component/s of the same paper which has no minimum for pass. After such deduction the balance of grace marks if any, shall be deducted equally (as far as possible) from the marks obtained in other paper/s of that semester, in the order of their appearance, without affecting the results (pass etc) of the candidate
- 14.6 Grace marks awarded as per 14.1 for passing a paper and 14.2 for passing the whole examination, and also the corresponding marks deducted as per 14.5, are to be shown only in the ledger and not in the statement of marks. However, the grace marks awarded for declaration of class shall be indicated in the statement of marks
- 14.7 Any fraction in the calculation of percentage of grace marks as above may be rounded off to the **next higher digit**
- 14.8 In case of tie, the candidate who secures marks without grace or less grace is preferred for Ranking / awarding Prizes / Medals.

- 14.9 The provision of grace marks as per 14.1 to 14.6 is not available for examinations conducted by the university, if the gracing in such examination is regulated by any Central Act

15.0 Declaration of Rank

- 15.1 Ranks shall be declared for the number of persons equal to 10% of the total number of candidates appearing for any final semester examination (fractions being rounded off to the **nearest integer** as per convention), subject to a minimum of 1 and maximum of 10 (Provided there were at least five candidates registered for the examination)
- 15.2 Rank shall be declared on the basis of the aggregate of the total marks secured by a candidate in all the semesters
- 15.3 Ranks shall be given from ONE onwards in the descending order of the total marks obtained in all the examinations considered for the purpose
- 15.4 If more persons than one are bracketed with the same marks, all of them shall get the same rank which is the highest possible rank for them. Ex. If two persons are bracketed with the same marks for top position, both will get the same rank (Rank - 1) and so on
- 15.5 Rank certificate shall be issued only up to Rank - X for ranks actually declared as per 15.1 above
- 15.6 Only candidates obtaining first class and above are eligible for ranks
- 15.7 A Repeater (including those who seek improvement) shall not be eligible for Rank

16.0 Marks Cards.

- 16.1 The marks card shall be laminated after affixing the hologram only when a candidate passes (at the time of passing) all papers of a particular semester

17.0 Barring of Simultaneous Study

- 17.1 No student admitted to a degree course in a college under the jurisdiction of this university, shall be permitted to study simultaneously in any other course leading to a degree (regular, evening, morning) offered by this university
- 17.2 If a candidate gets admitted to more than one course, the university shall cancel without giving prior notice his/her admission to all the courses to which he/she has joined

18.0 Miscellaneous:

- 18.1 These revised regulations will apply to the candidates admitted for the academic year 2002-2003 and onwards for the courses mentioned in Regulation No 10 above
- 18.2 Other regulations not specifically mentioned above are as per the Regulations of the University as applicable from time to time (replace year by semester if need be)
- 18.3 Any other issue not envisaged above, shall be resolved by the Vice-Chancellor in consultation with the appropriate Bodies of the University, which shall be final and binding

REGISTRAR

VICE-CHANCELLOR

I SEMESTER B.Sc.Ed

1.5 # M-1 : MATHEMATICS

CALCULUS I AND ANALYTICAL GEOMETRY I

Contact Hrs per Week: 6
Exam Duration: 3 Hrs

Max Marks: 150
Sessional : 50
Terminal : 100

OBJECTIVES: To understand and apply the concepts principles and techniques of Calculus in Problem solving, To appreciate and Use vector techniques for the study of Analytical Geometry and to acquire an insight into the pedagogical aspects of these topics

COURSE CONTENT.

UNIT 1

Functions, Limits and Continuity (Review) $-(\epsilon-\delta)$ definitions of limits and continuity -Algebra of limits and continuity –related properties
Differentiability (Review) $-(\epsilon-\delta)$ definition – Relation between Differentiability and Continuity - Algebra of Differentiability –successive differentiation –Lebniz Theorem

UNIT 2

Increasing and decreasing functions –Maxima and Minima –Concavity, Convexity and Point of Inflection –Tangents and Normals –Orthogonality and angle between two curves
Functions of several variables –Partial differentiation –Euler's theorem on homogeneous functions –Total derivatives –Extreme values –Method of Lagrange Multipliers

UNIT 3

Integral as anti-derivative and Techniques of Integration (only Review) – Definite Integrals –Properties and Techniques of evaluation –Reduction formulae -Definite Integral as limit of a sum –Area under a curve –Volumes of solids of revolution

UNIT 4

Vectors in R^2 and R^3 -scalar and vector product of two vectors –Projection of a vector on another –Scalar triple product and vector triple product (Only Review)

Vector Equation of a straight-line in space -deduction of corresponding Cartesian Equation –Angle between two lines –conditions for parallelism and perpendicularity –Shortest distance between two lines

Vector Equations of a Plane in various forms - deduction of corresponding Cartesian Equations –angle between two planes –angle between a line and a plane

Vector Equations of a Circle -deduction of corresponding Cartesian Equation
–Tangent to a circle

Vector Equations of a Sphere -deduction of corresponding Cartesian Equation
–Tangent Plane to a Sphere

UNIT 5

Vector functions - Vector functions of a scalar variable and their differentiation
–Gradient of a scalar field –Divergence and Curl of a vector field

Units 1 and 2 as in:

(i) Calculus of one and several variables by Salas & Hille Sections 1 6, 2 1, 2 2, 2 3, 2 4, 2 6, 3 1, 3 2, 3 3, 3 4, 3 5, 3 6, 3 7(all these sections only for review),

Sections 3 9, 3 10, 4 2, 4 3, 4 4, 4 5, 4 6 and

(ii) Calculus with Analytical Geometry by Ellis & Gullick Sections 13 3, 13 4, 13 8, 13 9

Units 3,4 and 5 as in

(i) Calculus and Analytical Geometry by G Thomas & Finney

(ii) Calculus I & II by LIPMAN Bers

Sessional Assessment :

1	Two tests each of 20 marks	40 marks
2	One test / assignment of 10 marks	10
	Total	: 50

II SEMESTER B.Sc.Ed

2.5 # M-2 : MATHEMATICS

REAL ANALYSIS AND ANALYTICAL GEOMETRY II

Contact Hrs per Week: 6

Exam Duration: 3 Hrs

Max Marks: 150

Sessional : 50

Terminal : 100

OBJECTIVES To develop an understanding of Structure of Real numbers, concept of limits, continuity and differentiability, Riemann Integration, convergence of numerical sequences and series, appreciate quadratic curves and surfaces

COURSE CONTENT:

UNIT 1

Real Numbers –Structure of Real line–absolute value– Intervals and Open sets –Properties of Open sets–Closed sets–Properties of Closed sets – bounded ness –lub –glb –completeness axiom –Archimedean Principle – related properties –limit points –Bolzano-Weirstrass' Theorem

Limit of a function –Continuity of a function –Properties of continuous functions on Closed intervals –Boundedness and attainment of bounds –Intermediate value theorem

Differentiability of a function – Differentiability and Continuity

UNIT 2:

Numerical sequences –Bounded sequences –Convergence of sequences – Theorems on Convergence of sequences –Cauchy sequences –Cauchy's Criterion for Convergence

Convergence of infinite series –Tests for Convergence –Comparison test – D'Alembert's ratio test –Cauchy's root test –Cauchy's Integral test –absolute convergence and conditional convergence – Leibniz' rule

UNIT 3:

Rolle's Theorem –Lagrange's Mean value theorem –Cauchy's Mean value theorem –Maclaurin's theorem and Maclaurin's infinite series expansion – Indeterminate forms and L'Hospital's Rule –Taylor's Theorem and Taylor's infinite series expansion

UNIT 4:

Riemann Integration –Integration over a closed and bounded interval –Upper and Lower Riemann Integrals –Definition of Riemann Integral –Criterion for Riemann Integrability –Properties of Riemann Integrable functions –Mean value theorem and Fundamental Theorem of Integral Calculus

UNIT 5:

Conic sections –Standard equations –Asymptotes –Foci, Directrices, eccentricity –Geometric properties –tangents –Conics in Polar coordinates – Rotations and Reflections –Changing coordinates –Rotating coordinate axes. Quadric curves –Algebraic curves –Curves of second degree –Discriminant and trace –Removing mixed terms and linear terms –positive discriminant – negative discriminant –zero discriminant

Quadric Surfaces –surfaces of second degree –Cylinders –cones –Ellipsoids –hyperboloids –Paraboloids –Ruled surfaces

Units 1 to 4 as in:

Mathematical Analysis by Shanthinarayan

Unit 5 as in:

Ch. 10 of Calculus II by Lipman Bers

Sessional Assessment :

1	Two tests each of 20 marks	40 marks
2	One test / assignment of 10 marks	10
	Total	: 50

III SEMESTER B.Sc.Ed

3.5 # M-3 : MATHEMATICS

ALGEBRA I AND GRAPH THEORY

Contact Hrs per Week: 6

Exam Duration: 3 Hrs

Max Marks: 150

Sessional : 50

Terminal : 100

OBJECTIVES: To develop an understanding of the concept of Number system and generalize it to abstract concepts of groups and rings and appreciate modern mathematical concepts, To understand the concepts of Graphs and their use as a mathematical model of real situations

COURSE CONTENT:

UNIT 1:

Set of Natural numbers –Induction Axiom –Order relation –Well ordering Principle

Structural properties of integers –Divisibility –Division algorithm –g c d and l c m –Euclid's algorithm –Unique factorization theorem

Structural properties of Rational numbers and Real numbers

Congruences of integers modulo n –Residue classes of integers modulo n – addition and multiplication modulo n –Euler's function – solution of linear congruences –Chinese remainder theorem –solution of simultaneous congruences

UNIT 2

Groups –Definitions and Examples –Abelian and non-abelian groups – Elementary properties –Cyclic groups –Permutation groups –groups of rigid motions –Order of a group –order of an element –finite and infinite groups – Subgroups –Conditions for subsets to be subgroups –subgroups of Cyclic groups and Permutation groups –Condition for product of subgroups to be a subgroup –Order of product of two finite subgroups

Cosets –left and right cosets –Congruence modulo a subgroup in a group – index of a subgroup in a group –Lagrange's theorem and its corollaries

UNIT 3:

Normal subgroups –Necessary and sufficient condition for a subgroup to be normal –Quotient group

Group Homomorphism –Definition, examples and elementary properties – Kernel of a group homomorphism –Isomorphism –Fundamental Theorem of Homomorphism –Isomorphism theorems –Cauchy's and Sylow's theorems for abelian groups
 Permutations –Transpositions and cycles –every Permutation is a product of disjoint cycles –Even and odd Permutations –Cayley's theorem

UNIT 4:

Definitions and examples of directed and undirected graphs – subgraphs – induced subgraphs – cutpoints – Blocks – Definition and examples of trail, Closed trail, Path, Cycle, Complete Subgraph, Connectedness, Component, Degree of a vertex, Adjacency matrix and incidence matrix of a simple graph, Odd and even degrees, Relations between degrees and the number of edges of a graph

Bipartite graphs and trees Definition and examples of bipartite graphs, Characterisation of bipartite graphs, Regular bipartite graphs and complete bipartite graphs, Definition and examples of trees, Spanning trees, Pendent vertex, Characterisation of trees, Independent cycle and basis of cycles, Cyclomatic number, Application of trees to (i) Kirchhoff's laws, (ii) Chemical Isomers

Traversability Definition and characterization of Eulerian graphs and Eulerian paths, Konigsberg Bridge Problem, Definition and examples of Hamiltonian graphs, Statement and illustration of Chvatal's theorem regarding Hamiltonian cycles

UNIT 5:

Invariants Definition and illustrations of – the point covering number, the line covering number, the independence number, the line independence number of a graph, The relation of these invariants – Relation between the point covering number and the line independence number for bipartite graph, Definition and examples of matching and perfect matching of a graph

Planarity Definition and illustration of planar graphs, Euler polyhedra formula, Homeomorphic graphs, Statement and illustration of Kurtowski theorem, Some simple properties of planar graphs

Colorability Definition and examples, The chromatic number; The chromatic index of a graph Statement and illustration of four colour theorem

Units 1,2 and 3 as in: Topics in algebra by I N Herstein

Units 4 and 5 as in:

1.Graph Theory by S A Choudum, Macmillan India Ltd., Madras

2 Graph Theory by Harare

3.Graph Theory by Bondy and Murthy

**4.Graphs and Applications – An Introductory Approach by
 Joan M Aldous & Robin J Wilson, Springer 2000.**

Sessional Assessment :

1	Two tests each of 20 marks	40 marks
2	One test / assignment of 10 marks	10
	Total	: 50

IV SEMESTER B.Sc.Ed.

4.5 # M-4 : MATHEMATICS

NUMERICAL ANALYSIS AND OPERATIONS RESEARCH

Contact Hrs per Week: 6

Exam Duration: 3 Hrs

Max Marks. 150

Sessional : 50

Terminal : 100

OBJECTIVES: To enable and apply Numerical methods in solving problems related to real life situations with help of computers, which have become indispensable in modern world.

COURSE CONTENT:

UNIT 1:

Finite differences Meaning of finite differences, Forward difference Operator, Higher order forward differences, Finite difference table, Newton-Gregory forward interpolation formula, Backward difference operator, Newton-Gregory backward interpolation formula, Central differences, Interpolation in case of unequal intervals – Meaning of divided difference table, Newton's divided difference interpolation formula and Lagrange's interpolation formula

UNIT 2:

Numerical Differentiation Differentiation based on 'equal intervals interpolation formulae' and on 'unequal intervals interpolation formulae'
Numerical Integration Trapezoidal rule, Simpson's 1/3 and 3/8 rules, Weddle's rule

UNIT 3:

Solution of algebraic and transcendental equations – Bisection method, method of false position, iteration method, Newton-Raphson's method, Statement of convergency conditions in case of iteration and Newton-Raphson methods

Solution of simultaneous linear equations – Cramer's method, Matrix inversion method, Gaussian elimination method, Gauss-Jordan method, Gauss-Crout's method and Gauss-Seidel iteration method (with the statement of convergency condition only)

UNIT 4:

Numerical solution of ordinary differential equations of first order, Taylor's series method, Euler's method, Euler's modified method, Picard's method, Runge-Kutta methods of second order

(Units 1 to 4 to be taught with emphasis on algorithmic approach keeping in mind all the characteristics of an algorithm.)

UNIT 5:

Introduction to Operations Research, General Nature of Operations Research Assignment Problems, Statement, Formulation and solution by Reduced Matrix Method (Hungarian Method)

Transportation Problems Statement and formulation of transportation problems, balanced and unbalanced transportation problems, Definition of feasible and Basic Feasible Solutions, Independent Allocations, North-West Corner Method, Unit Penalty Method (Vogel's method), Degenerate and Non-degenerate Basic Feasible Solutions, Definition of Optimal solution, the transportation algorithm to obtain optimal solution, Comparison with Assignment Problem

Linear Programming General format and formulation of the Linear Programming Problem, Basic Feasible solution, Optimal solution, Solution by graphical method, Simplex method, Degeneracy in Simplex method, Assignment Problem and transportation problem as particular cases of Linear programming problem

Units 1 to 4 as in:

(i) Numerical Analysis by Guptha R

(ii) Numerical Algorithms by Krishnamurthy E V & Sen S K (only for Algorithms)

Unit 5 as in:

Operations Research by Manmohan Singh et al

Sessional Assessment :

1	Two tests each of 20 marks	40 marks
2	One test / assignment of 10 marks	10
	Total	: 50

V SEMESTER B.Sc.Ed

5.7 # M-5 : MATHEMATICS

DIFFERENTIAL EQUATIONS AND CALCULUS

Contact Hrs per Week: 6

Exam Duration: 3 Hrs

Max Marks: 150

Sessional : 50

Terminal : 100

OBJECTIVES To enable the students to understand and use methods of ordinary differential equations, to compute areas of plane regions and surfaces and volumes of solids

COURSE CONTENT:

UNIT 1:

Nature of Differential Equations –Formation of differential equations from physical situations –order, degree and solution of a differential equation – Geometrical meaning

First order differential equations –equations with separable variables – Homogeneous equations and equations reducible to homogeneous equations –Linear equations –Exact equations and Integrating factors –Applications of first order differential equations to Geometry –Orthogonal trajectories – Physical problems of growth, decay, chemical reactions, falling bodies and other rate problems

UNIT 2:

Second order linear equations - homogeneous equations and general solutions –Use of a known solution to find another - homogeneous equations with constant coefficients

Non- homogeneous equations and the method of undetermined coefficients – The method of variation of parameters –Application of second order linear equations to physical problems –vibrations in mechanical systems and electrical systems

UNIT 3

Methods of Laplace Transforms –elementary properties of Laplace transforms –Inverse Laplace transforms – Initial value problems -the use of Laplace transforms to find the solution of a second order linear Initial value problem with constant coefficients

UNIT 4:

Double Integral of a non-negative function over an interval –double integral as an iterated Integral –analytic definition –Double Integrals over general sets – Properties of Double Integrals –Double Integrals in Polar coordinates –Areas of plane regions and surfaces of revolution

Triple Integral in cartesian, Cylindrical and polar coordinates –Volumes of revolution

UNIT 5

Improper Integrals –definition –convergence of Improper Integrals of first and second kinds –A sufficient condition for two improper integrals to behave alike The gamma functions –definition and properties of gamma functions – Applications to evaluations of Integrals

Beta functions - definition and properties of beta functions - Applications to evaluations of Integrals.

Relations between Beta and Gamma functions –duplication formula' and Sterling's formula

Units 1 to 3 as in:

Chapters 1, 2,3 and 10 of Differential Equations by George Simmons, TMH Edition

Unit 4 as in:

Calculus II by L.Bers Chapter 13

Unit 5 as in:

Advanced Calculus by Spiegel M R Chapters 12 and 13.

Sessional Assessment :

1	Two tests each of 20 marks	40 marks
2	One test / assignment of 10 marks	10
	Total	: 50

VI SEMESTER B.Sc.Ed

6 7 # M-6 : MATHEMATICS

LINEAR ALGEBRA

Contact Hrs per Week: 6

Exam Duration: 3 Hrs

Max Marks: 150

Sessional : 50

Terminal - : 100

OBJECTIVES To enable the students to understand and apply concepts of Linear Algebra in solving appropriate problems

COURSE CONTENT:

UNIT 1:

Rank of a matrix –Row rank and Column rank –Echelon matrices – Elementary operations –Rank and Inverse of a matrix and their computation – Elementary matrices –Linear equations and their solutions –consistency and general solution

Determinant of a matrix –Determinant function –Properties of determinant function –Expansion of determinants –Determinant of a square matrix – Adjoint and inverse of a matrix –Characteristic polynomial –Rank of a determinant

(as in Chapters 2 and 3 of First course in Linear Algebra by P K Bhattacharya et al)

UNIT 2:

Vector spaces –subspaces –basis –dimension –coordinates –row equivalence –computations concerning subspaces

(as in Ch 2 of Linear Algebra by Hoffman and Kunze)

Linear Transformations –Null space, Range, Rank and nullity of a linear transformation –Rank-Nullity Theorem

(as in Ch.3 section 3.1 of Linear Algebra by Hoffman and Kunze)

UNIT 3

Algebra of Linear transformations –Isomorphism –Representation of linear transformation by matrices and vice versa –effect of change of basis on matrix of a linear transformation

Linear functionals –Annihilators – transpose of a linear transformation

(as in Ch.3 sections 3.2 to 3.7 of Linear Algebra by Hoffman and Kunze)

Unit 4:

Direct sum decomposition –Characteristic values and characteristic vectors of a linear transformation –Cayley-Hamilton theorem –Diagonalisable linear operators

(as in Ch.6 of Linear Algebra by Hoffman and Kunze)

UNIT 5:

Inner Products –Inner Product spaces –Triangular inequality and Cauchy-Schwarz inequality –Gram-Schmidt Orthogonalization process –Linear functionals and adjoints

(as in Ch.8 Sections 8.1 to 8.3 of Linear Algebra by Hoffman and Kunze)

Bilinear forms –Symmetric bilinear forms –quadratic forms associated with a Bilinear form

(as in Ch.9 sections 9.1 and 9.2 of Linear Algebra by Hoffman and Kunze)

Sessional Assessment :

1	Two tests each of 20 marks	40 marks
2	One test / assignment of 10 marks	10
	Total	: 50

VII SEMESTER B.Sc Ed

7.8 # M-7 : MATHEMATICS

PROBABILITY AND STATISTICS

Contact Hrs per Week: 6

Exam Duration: 3 Hrs

Max Marks: 150

Sessional : 50

Terminal : 100

OBJECTIVES: To enable the students understand the concepts of probability and its use in decision-making situations and use parametric and non-parametric tests in problem situations

COURSE CONTENT:

UNIT 1.

Concept of Probability, Definitions – experiment, outcomes, events, favourable cases, equally likely cases, mutually exclusive events, exhaustive events, classical or mathematical definition of Probability, Statistical

Probability definition, Axiomatic Probability definition, Theorems based on the axiomatic probability definition, Dependent and Independent events, additional theorem of Probability, conditional events, conditional probability, Multiplication theorem of probability and Bayes Theorem of Probability

UNIT 2:

Random Variables – Discrete Variable, Continuous variable, Distribution of Random Variable, probability mass function, probability density function, distribution function and probability density curve

Mathematical Expectation, addition and multiplication theorem of expectations and moments in terms of expectation

UNIT 3:

Distributions Bernoulli Distribution, Binomial Distribution – Probability function, moments, recurrence relation for moments and fitting a Binomial distribution, Poisson distribution – probability function, moments, recurrence relation for moments and fitting of a Poisson distribution, Poisson distribution as a limiting case of Binomial distribution

UNIT 4:

Normal distribution – Probability density function, probability density curve (Normal curve), moments, mean, median, mode, standard deviation, quartile deviation, mean deviation about mean, area property of normal curve, fitting of a normal distribution and importance of normal distribution

UNIT 5:

Statistical Inference, Population, Samples and Statistics, Estimation, Hypothesis Testing, Some properties of Hypothesis Tests, Important Parametric tests – Binomial, Normal, t, chi-square and F, Analysis variance computation, Some common Non parametric Tests – Binomial, Sign Test, Man-Whitney Smirnov Two Sample Test and Wilcoxon Test for paired samples

(Only Problems based on all these Tests)

Units 1 to 5 as in:

- (i) *Introduction to Mathematical Statistics by Hogg R V & Craig A T Chapters 1, 2, 3(sections 3.1, 3.2, 3.4), chapter 7(sections 7.1, 7.2, 7.3), chapter 8(sections 8.1, 8.3, 8.5), chapter 9(sections 9.3, 9.4, 9.6),*
- (ii) *Fundamentals of Mathematical Statistics by Kapoor and Gupta, Sultan Chand & Co*

Sessional Assessment :

1	Two tests each of 20 marks	40 marks
2	One test / assignment of 10 marks	10
	Total	: 50

VIII SEMESTER B.Sc.Ed

8.4 # M-8 : MATHEMATICS

COMPLEX ANALYSIS AND ALGEBRA II

Contact Hrs per Week: 6
Exam Duration: 3 Hrs

Max Marks. 150
Sessional : 50
Terminal : 100

OBJECTIVES: To develop the understanding application of the concepts of complex analysis and Algebra in problem solving situations

COURSE CONTENT:

UNIT 1:

Complex number –Definition –Algebraic properties –Cartesian Coordinates – Triangle inequality –Polar coordinates –Powers roots –Regions in the Complex plane –Points at infinity

Functions of a complex variable –Mappings –Limits –theorems on limits and continuity

(As in Sections 1 to 13 of Complex variables and applications by Churchill et al)

Differentiation of functions of a complex variable –Differentiation formulae – Cauchy-Riemann equations –sufficient conditions - Cauchy-Riemann equations in polar form –analytic functions –harmonic functions

(As in Sections 14 to 20 of Complex variables and applications by Churchill et al)

UNIT 2:

Elementary functions-Exponential functions –properties of $\exp z$ – Trigonometric functions – hyperbolic functions – Logarithmic functions and properties

(As in Section 21 to 28 of Complex variables and applications by Churchill et al)

Mapping by Elementary functions – Linear functions – The function $1/z$ –

The transformation $w = \exp z$

(As in Sections 31 to 35, 38 of Complex variables and applications by Churchill et al)

UNIT 3:

Complex Integration – Definite Integrals – contours – line integrals and examples – Cauchy – Goursat theorem and its proof –Indefinite integrals – Cauchy Integral formula – Derivatives of analytic functions – Morera's theorem – Liouville's theorem – the fundamental theorem of Algebra

(As in Sections 42 to 55 of Complex variables and applications by Churchill et al).

UNIT 4:

Definiton and examples of rings –Elementary properties of Rings –Ring with unit element –Commutative and Non- Commutative Rings –examples & properties -Subrings–examples - Necessary and sufficient conditions for subsets to be subrings

Some special classes of Rings -Definiton and examples of Integral Domains, Division Rings and fields –Relations between them and their elementary properties -Subdomains and subfields –Examples -Necessary and sufficient conditions for subsets to be subdomains and subfields - Units and associates. Ideals in a Ring –Maximal Ideal, Principal Ideal and Prime Ideals-UFD, PID and ED –Examples and Properties

Ring homomorphisms –isomorphisms –examples and properties –Kernel of a Ring homomorphisms –condition for a homomorphism to be an isomorphism Quotient Ring –definition, examples –Quotient rings Maximal Ideals and prime ideals –Field of Quotient of an Integral domain.

UNIT 5:

Polynomial rings –Definition of Polynomial rings over a Field F –degree of a polynomial – $F[x]$ is an Integral Domain –Divisibility of polynomials –Division algorithm –Remainder theorem –Factor theorem –Illustrations and Results Irreducible polynomials –Definition and examples of reducible, irreducible, primitive and integer-monic polynomials –The Gauss' lemma –Eisenstein's criterion

Definition of g c d and l c.m in $F[x]$ –Ideals in $F[x]$ –Unique factorization theorem

(Units 4 and 5 as in Topics in Algebra by I N Herstein)

Sessional Assessment :

1	Two tests each of 20 marks	40 marks
2	One test / assignment of 10 marks	10
	Total	: 50

I SEMESTER B.Sc.Ed.

1.7 # P.1 : PHYSICS THEORY

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES: To provide an understanding of the broad conceptual framework of physics, through demonstrations, problem solving, laboratory exercises, etc , To demonstrate integration of content with methodology

COURSE CONTENT:

UNIT 1 : MEASUREMENT AND VECTORS

Measurement Measurement (a review), Physical Quantities, Standards and Units, Standard of Length, Standard of Mass, Standard of Time, System International

Vectors Vectors and Scalars, Addition of vectors – Geometrical Method, Resolution and Addition of Vectors – analytical Method, Multiplication of Vectors, Vectors and Laws of Physics, Gradient of a scalar function, divergence and curl of a vector

UNIT 2 : KINEMATICS (REVIEW)

Motion in One Dimension: Mechanics, Particle Kinematics, average velocity, instantaneous velocity, one-dimensional motion, variable acceleration, constant acceleration, consistency of units and dimensions, freely falling bodies, equation of motion for free fall

Motion in a Plane: Displacement, velocity and acceleration, motion in a plane with constant acceleration, projectile motion, tangential and radial acceleration in circular motion, Polar coordinates, relative velocity and acceleration

UNIT 3 : PARTICLE DYNAMICS

Particle Dynamics (Review) Classical mechanics, Newton's First Law, Force, Mass, Newton's Second Law, Newton's Third Law of Motion, The Force laws, Weight and mass, static procedure for measuring forces, some applications of Newton's Laws of motion and frictional forces

Work and Energy Introduction, work done by a constant force, work done by a variable force – one dimensional case, work done by a variable force – two dimensional case, kinetic energy and work-energy theorem, significance of the work-energy theorem, power

UNIT 4 : CONSERVATION LAWS & COLLISIONS

Conservation Laws: Introduction, conservative forces, potential energy, one dimensional conservative systems, complete solution of problems for one dimensional forces depending on position only, two and three dimensional, conservative systems, non-conservative forces, the conservation of energy, mass and energy, center of mass, motion of center of mass, linear momentum of a particle, linear momentum of a system of particles, conservation of linear

momentum, some applications of momentum principle, systems of variable mass – rocket propulsion.

Collisions What is a collision? Impulse and momentum, conservation of momentum during collisions, collision in one, two and three dimensions

UNIT 5 : ROTATIONAL KINEMATICS

Rotational variables, Angular quantities as vectors, Rotation with constant angular acceleration, Linear and angular variables, kinetic energy of rotation, calculating the rotational inertia – of a rod, sphere and cylinder, Torque, Newton's Second Law of rotation, work power and work-kinetic energy theorem

References

- 1 Fundamentals of Physics, Halliday, Resnick & Walker
- 2 University Physics, Sears & Zeemansky

Sessional Assessment : 2 Tests OR 1 Test and 1 assignment.

I SEMESTER B.Sc.Ed.

1.7 # P-1P PHYSICS PRACTICALS

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

OBJECTIVES : To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises

COURSE CONTENT:

(A minimum of TEN experiments out of the following)

- 1 Study of the motion of an air bubble
- 2 Study of the rate of flow of water through a capillary tube under different pressure heads
- 3 To study the relation between force and extension produced in a stretched spring
- 4 To study the relation between length and time period of a simple pendulum
- 5 Study of the motion of a freely falling body
- 6 Study of the dependence of the period of oscillation of a spring-mass system on mass.
- 7 Study of the acceleration of a body subjected to different unbalanced forces
- 3 Study of accelerations of different masses under a constant unbalanced force

- 9 Study of conservation of energy and momentum in head-on-collision between two spheres of equal mass
- 10 Study of conservation of momentum and energy of a collision in a plane
- 11 Conservation of momentum in an explosion
- 12 Study of the relation between pressure and volume of a gas at constant temperature

Sessional Assessment :

1	Practicals	· 40 marks
2	Records	10
	Total	: 50

II SEMESTER B.Sc.Ed.

2.7 # P-2 · PHYSICS THEORY

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES. To provide an understanding of the broad conceptual framework of physics through discussions, demonstrations, problem solving, laboratory exercises etc, To demonstrate integration of content with methodology

COURSE CONTENT:

UNIT 1 : GRAVITATION & CENTRAL FORCE

Gravitation: Historical Introdyction, The law of Universal Gravitation, Universal Gravitation constant 'G', inertial and gravitational mass, variation in acceleration due to gravity, motion of planets and satellites, gravitational field and potential gravitational potential energy, potential energy for many particle systems, calculation of fields and potential for (a) a spherical shell and (b) sphere of uniform density, energy considerations in the motion of planets and satellites

Central Force Kepler's Laws of planetary motion, the inverse square force, Rutherford's problem, derivation of Kepler's Laws from universal law of gravitation

UNIT 2: WAVES IN ELASTIC MEDIA & SOUND WAVES

Oscillations: Simple Harmonic Motion (SHM), force law, SHM equation and idea of phase and phase difference, energy considerations in simple harmonic motion.

Waves in elastic media: Mechanical waves, types of waves, traveling waves, the super position principle, wave speed, power and intensity in wave motion, interference of waves, standing waves, resonance

Sound Waves: Audible, ultrasonic and infrasonic waves, propagation and speed of longitudinal waves, traveling longitudinal waves, standing longitudinal waves, vibrating systems and source of sound, beats and Doppler Effect, wave equation for sound pressure, sound power and measuring unit (decibel)

UNIT 3 : HEAT & FIRST LAW OF THERMODYNAMICS

Thermal equilibrium, Zeroth law of thermodynamics, ideal gas temperature scale, heat as a form of energy, quantity of heat and specific heat, molar heat capacities of solids, the mechanical equivalent of heat, heat and work, First law of thermodynamics, some special cases of the first law of thermodynamics – (i) adiabatic process, (ii) isochoric process, (iii) cyclic process, (iv) free expansion

UNIT 4 : KINETIC THEORY OF GASES

Kinetic Theory of Gases (Review) Introduction, an ideal gas – a macroscopic description, an ideal gas – a microscopic description, kinetic calculation of pressure, kinetic interpretation of temperature, ideal gas scale, intermolecular forces, specific heats of an ideal gas, law of equipartition of energy
Mean free path, distribution of molecular speeds, Van der Waals equations of state, critical constant, application to liquefaction of gases

UNIT 5 : ENTROPY & SECOND LAW OF THERMODYNAMICS

Introduction, reversible and irreversible processes, the Carnot cycle, Carnot engine, Carnot theorem, absolute scale of temperature, second law of thermodynamics, efficiency of engines, the thermodynamic temperature scale, entropy in reversible and irreversible processes, entropy and the second law, entropy and disorder, consequences of second and third law of thermodynamics

References:

- 1 Fundamentals of University Physics, Halliday, Resnick & Walker
- 2 Heat & Thermodynamics, D S Mathur
- 3 Heat & Thermodynamics, Sears, Zeemansky
- 4 Physics of Vibration & Waves, H J Pain

Sessional Assessment : 2 Tests OR 1 Test and 1 assignment.

II SEMESTER B.Sc.Ed.

2.7 # P-2P : PHYSICS PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises

COURSE CONTENT:

(A minimum of TEN experiments out of the following).

1. Study of velocity of waves on a slinky under tension
2. Study of the oscillations of a column of water as a function of its length and of damped oscillation
3. To determine the velocity of sound at 0°C and the end correction by setting up a resonance column (first resonance length)
4. Study of the variation of the time period of a bar pendulum with different length and determination of 'g' at the given place
5. Study of torsional oscillations of a loaded wire and determination of the rigidity modulus of the material of the wire
6. Study of the motion of a steel sphere in a viscous liquid and determination of the coefficient of viscosity of the liquid
7. Study of transverse vibrations on a sonometer. To determine the frequency by (i) absolute method, (ii) Comparison method
8. Study of Newton's law of cooling
9. Melde's experiment – determination of frequency
10. Determination of solar constant
11. Study of variation of pressure and temperature of a gas at constant volume
12. J by Joules Calorimeter
13. Lees and Charlton disc – Thermal conductivity of a bad conductor
14. Specific heat of a solid by the method of mixtures

Sessional Assessment :

1	Practicals	40 marks
2	Records	10
	Total	: 50

III SEMESTER B Sc.Ed.

3.7 # P-3 : PHYSICS THEORY

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES: To provide an understanding of the broad conceptual framework of physics through discussions, demonstrations, problem solving, laboratory exercises, etc., To demonstrate integration of content with methodology

COURSE CONTENT:

UNIT 1 : ELECTROSTATICS

Electrostatics Charge and matter, Electric charge, Conductors and insulators (review only), Coulomb's law, electric field and potential, Calculation of field strength, Potential due to a point charge and a dipole, Point charge in an electric field, Dipole in electric field, Gauss's law and its applications, Relation between electric potential and field strength, Potential due to a group of point charges, Electric potential energy, Calculation of E from V, Insulated conductor

UNIT 2 : CAPACITANCE AND DIELECTRICS

Capacitance, parallel plate capacitor, capacitors in series and parallel, calculation of capacity for a spherical and cylindrical capacitor, Energy stored in a capacitor, Capacitor with dielectric, atomic view of dielectrics, Polarisation, Electric field due to a polarised dielectric material, Gauss's law in dielectrics, Dielectric constant, Energy density of an electrostatic field (with and without dielectric)

UNIT 3 : CURRENT ELECTRICITY

Current and resistance, Current and Current density, Resistance, Resistivity, Conductivity, Ohm's law, Resistances in series and parallel combination, Atomic view of resistivity

Electromotive force and circuits e m f and current, Potential differences, Kirchoff's laws Wheastones bridge, RC circuits, Network theorems, (Thevnin's, Norton's, Milmans), Superposition theorem, Maximum power transfer theorem

UNIT 4 : MAGNETOSTATICS

Ampere's law, B near a long wire, Magnetic lines of induction, force between two parallel conductors, Definition of Ampere, B for a solenoid, Biot-Savart law

The magnetic field – Lorentz force and definition of magnetic field, magnetic induction, magnetic force on a current element, Hall effect, circulating charges, cyclotron

UNIT 5 : ELECTROMAGNETIC INDUCTION

Faraday's law, Faraday's experiment, Law of electromagnetic induction, Lenz's Law, Time varying magnetic fields, application in Betatron
Inductance Self inductance, LR circuit, energy in a magnetic field, magnetic energy density

References:

- 1 Unified Physics, R P Goel
- 2 Fundamentals of Physics, Halliday, Resnick & Walker
- 3 Feynmann Lectures, Vol II

Sessional Assessment : 2 Tests OR 1 Test and 1 assignment

III SEMESTER B.Sc.Ed.

3.7 # P-3P : PHYSICS PRACTICALS

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks : 50

Sessional . 50

Terminal . Nil

OBJECTIVES : To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

- A Resistance measurements
- B Capacitance measurements
- C EMF measurements
- D RC circuits
- E Magnetic Induction measurements
- F Ampere's Law

Sessional Assessment :

1	Practicals	40 marks
2	Records	10
	Total	: 50

IV SEMESTER B.Sc.Ed.

4.7 # P-4 : PHYSICS THEORY

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES: To provide an understanding of the broad conceptual framework of physics theory, discussions, demonstrations, problem solving, laboratory exercises etc, to demonstrate integration of content with methodology

COURSE CONTENT:

UNIT 1 : NATURE OF LIGHT

Nature of Light (Review) Light – electromagnetic spectrum, energy and momentum, speed of light, moving sources and observers, Doppler effect, Huygen's Principle – Laws of reflection and refraction, Phase change on reflection, Total internal reflection, Fermat's principle

UNIT 2 : INTERFERENCE

Young's experiment – coherence, Intensity distribution, Newton's rings, Interference in thin films, colours of thin films, interference in air wedge, Michelson's Interferometer, Multiple beam interference – Fabry-Perot Interferometer

UNIT 3 : DIFFRACTION

Fraunhofer And Fresnel Diffraction, Diffraction at a single slit, double slit, Diffraction by multiple slits, Diffraction grating, Resolving power – Rayleigh's criterion, Resolving power of a grating and telescope
Fresnel diffraction, half period zone, zone plate, diffraction at a circular aperture and at a straight edge (qualitative treatment only)

UNIT 4 : POLARISATION

Polarization by reflection, Brewster's law, Malus law, Double refraction, Production and detection of linearly, circularly and elliptically polarized light, Quarter and half wave plates, Polaroids, Optical activity, A qualitative study of dispersion and scattering of light – Rayleigh scattering – blue of the sky and ocean, Raman Effect

UNIT 5 : A.C. CIRCUITS

Sinusoidal voltage, Current voltage relation in resistance, Inductance and capacitance, Reactance and impedance, Power in A C circuits, RMS values, Power factor, Series LCR circuit and parallel LCR circuit and resonance, Mutual inductance and principle of transformer

References:

- 1 Textbook of Optics, Brijlal & Subramaniam
- 2 Optics, A K Ghatak
- 3 Fundamentals of Optics, Jenkins & White
- 4 Fundamentals of Optics, Khanna & Gulati
- 5 Electricity & Magnetism, Fewkes & Yarwood
- 6 Electricity & Magnetism, D C Tayal
- 7 Electricity & Magnetism, Murukesan

Sessional Assessment : 2 Tests OR 1 Test and 1 assignment.

IV SEMESTER B Sc.Ed.

4.7 # P-4P : PHYSICS PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

- A Refraction at Spherical Surface
- B Spectrometer experiments using prism
- C Experiments on Interference
- D Experiments on Diffraction
- E Experiments on Polarisation
- F Experiments on resistance/capacitance using ballistic galvanometer
- G Network theorems
- H Phase relationships for a c

Sessional Assessment .

1	Practicals	40 marks
2	Records	10
	Total	: 50

V SEMESTER B.Sc.Ed

5.9 # P-5 : PHYSICS THEORY

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES:

1. To provide an understanding of electromagnetic theory
2. To provide an elementary understanding of special theory of relativity and modern physics

COURSE CONTENT:

UNIT 1 : ELECTROMAGNETIC THEORY & MAXWELL'S EQUATION

Displacement current, Maxwell's equations in SI units, Generating an e m wave, The traveling e m wave – qualitative and quantitative (wave equation), Energy transport and Poynting vector, radiation pressure

UNIT 2 : X-RAYS

Production and properties, X-ray diffraction, Bragg's law, Bragg's X-ray spectrometer, Laue Diffraction, Powder method, Continuous and characteristics spectra, Moseley's law, Absorption of X-rays, Interaction of X-rays with matter, Compton effect

UNIT 3 : ATOMIC PHYSICS

Bohr atom model, Energy levels and spectra, Rydberg's constant, Spectra of Hydrogen – like atoms, Bohr's correspondence principle, Vector model of the atom, Quantum numbers, Electron spin, Stern-Gerlach experiment, Spin-orbit coupling, Pauli's exclusion principle, L-S coupling, J-J coupling, Spectral notations, one-electron spectra, two-electron spectra

UNIT 4 : LASER AND HOLOGRAPHY

Spontaneous and stimulated emission, Density of states, Einstein's A and B coefficients, Ratio of stimulated to spontaneous transitions in a system in thermal equilibrium, condition for amplification, population inversion, methods of optical pumping, energy level schemes of He-Ne and Ruby laser Elementary ideas of gas laser, dye-laser and semiconductor laser Basic concepts of holography Construction of a hologram, Reconstruction of the image

UNIT 5 : SPECIAL THEORY OF RELATIVITY

Galilean transformation and Newtonian relativity, speed of light, Michelson-Morley experiment and Einstein's principle of relativity, Lorentz transformation, Time dilation and length contraction, velocity addition theorem, Relativistic momentum, Energy and momentum conservation and relativistic energy, mass-energy equivalence, Examples from chemical and nuclear reactions, fission and fusion

References:

- 1 Introduction to Electrodynamics, Griffiths
- 2 Lasers, Ghatak and Thyagarajan
- 3 Lasers and Non-Linear Optics, B B Laud, Wiley Eastern
- 4 Atomic Physics, J B Rajam
- 5 Perspectives of Modern Physics, Beiser
- 6 Introduction to Modern Physics, Mani & Mehta

Sessional Assessment : 2 Tests OR 1 Test and 1 assignment.

V SEMESTER B.Sc.Ed.

5.9 # P-5P : PHYSICS PRACTICALS

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

OBJECTIVES To develop the ability to set up apparatus, collect data and to analyse the data for determining the desired physical quantity

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

Experiments on

- A Electromagnetic induction
- B A C and D C Bridges
- C Laser diffraction
- D Ballistic galvanometer
- E Elasticity
- F Galvanometers

Sessional Assessment :

1	Practicals	40 marks
2	Records	10
	Total	: 50

VI SEMESTER B.Sc.Ed.

6.9 # P-6: PHYSICS THEORY

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES: To provide an understanding of fundamentals of electronic concepts and devices including digital electronics and principles of communication

COURSE CONTENT:

UNIT 1 : SEMICONDUCTOR CHARACTERISTICS AND APPLICATIONS

Intrinsic semiconductors, electron and hole concentration in thermal equilibrium, Fermi level, Impurity semiconductors, donor and acceptor levels P-N junction, Half and full wave rectifiers, rectifier equation, junction breakdown, Zener diode, expression for potential barrier, depletion width and junction capacitance with derivation, diode resistance

UNIT 2: TRANSISTORS

Bipolar junction transistor, PNP and NPN transistors, Characteristics and operation in different configurations, FET and its characteristics, current amplification, Transistor as a four-pole device, h-parameters in CE configuration

Transistor as an amplifier, single stage small-signal CE amplifier, emitter follower amplifier, Transistor as power amplifier

UNIT 3 : TRANSISTOR AS OSCILLATOR

Requirements and basic principle of an oscillator, Barkhausen criterion, Wien-bridge, oscillator, Hartley oscillator and Colpitt's oscillator, Introduction to OP-AMP and its applications

UNIT 4 : DIGITAL ELECTRONICS

Binary to decimal and decimal to binary conversion, Binary addition and subtraction, octal number, Hexa-decimal number, Postulates of Boolean algebra and its properties

Digital logic gates – AND, OR, NOT, NAND, NOR and Exclusive OR (XOR) operation and half adder De Morgan's theorems

UNIT 5 : COMMUNICATION ELECTRONICS

Propagation of radio waves (in the absence of magnetic field), Role of ionosphere, Elementary idea of microwave, optical fibre and satellite communication

Basic theory of amplitude modulation, Transistor as an amplitude modulator, Basic idea of frequency and phase modulation, P-N diode as a square law and linear detector.

References:

- 1 Electronic Devices & Circuits, Millman & Halkias
- 2 Electronic Principles, Malvino
- 3 Basic Electronics (5th Edn), Theraja B L
- 4 Basic Electronics, Mittal G K
- 5 Digital Principles and Applications, Malvino & Leech
- 6 Electronic Circuits and Systems, Y N Bapat
- 7 Principles of Communication Systems, Taub & Schilling
- 8 Satellite Communications, D C Agarwal
- 9 Optical Communications, Goward

Sessional Assessment : 2 Tests OR 1 Test and 1 assignment.

VI SEMESTER B.Sc.Ed.

6.9 # P-6P . PHYSICS PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To develop the ability to design and connect simple electronic circuits and to collect and analyse the data using these circuits; To develop skills in using electronic instruments like multimeters and oscilloscopes

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following.)
Experiments on

- A Junction diode characteristics
- B Zener diode characteristics
- C Junction Transistor characteristics
- D FET characteristics
- E Rectifier circuits
- F Transistor amplifier CE configuration
- G Transistor amplifier Emitter follower
- H Transistor Oscillator
- I Logic gates
- J Experiments on OP-AMP
- K Lissajous figures
- L Experiments on modulation and demodulation

Sessional Assessment :

1	Practicals	40 marks
2	Records	10
	Total	: 50

VII SEMESTER B.Sc Ed.

7.12 # P-7 : PHYSICS THEORY

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES: To provide a basic understanding of quantum and statistical physics, to apply the knowledge of quantum physics to microsystems

COURSE CONTENTS:

UNIT 1: WAVE MECHANICS

Inadequacies of Classical Physics – Black body radiation, Planck's hypothesis, Photoelectric effect, Wave particle duality, G P Thompson and Davisson-Germer experiment, de Broglie waves

Wave function, Interpretation of wave function, Wave packets, Group and Wave velocities

UNIT 2 : DEVELOPMENT OF SCHRODINGER EQUATION

Postulates of quantum mechanics, Probability density, Expression for probability current density, Eigen function and eigen values, Expectation values, Normalization of wave functions, properties of wave functions, uncertainty principle, Schrodinger equation

UNIT 3 . APPLICATIONS OF SCHRODINGER EQUATION

Schrodinger equation of a free particle in one-dimensional infinite potential well, Calculation of the eigen-function and eigen-values, Harmonic oscillator, Rigid rotator

UNIT 4 : CLASSICAL STATISTICS

Phase space, Micro and macro states, Thermodynamic probability, Entropy and probability, Principle of equal a priori probability, Probability distribution Distribution of molecular velocities, Maxwell-Boltzmann distribution function, Most probable, average and r m s velocity, Principle of equipartition of energy

UNIT 5 : QUANTUM STATISTICS

Failure of Classical Statistics, Postulates of quantum statistics, Indistinguishability, wave function and exchange degeneracy, Bose-Einstein statistics, Fermi-Dirac statistics, Partition function

References:

- 1 Quantum Mechanics, L I Schiff
- 2 Perspectives of Modern Physics, Beiser
- 3 Introduction to Quantum Mechanics, Pauling & Wilson
- 4 A Treatise on Heat, Saha & Srivastava
- 5 Introduction to Statistical Physics, B B Laud
- 6 Statistical Mechanics, K Huang
- 7 Heat & thermodynamics, D S Mathur

Sessional Assessment : 2 Tests OR 1 Test and 1 assignment.

VII SEMESTER B.Sc.Ed.

7.12 # P-7P : PHYSICS PRACTICALS

Contact Hrs per Week: 3

Exam Duration. Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

OBJECTIVES: To develop the ability to set up apparatus, to collect and analyse the data to determine the desired physical quantity

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

Experiments on

- A Biprism
- B Spectrometer
- C Series and Parallel Resonance
- D Current balance-magnetic induction
- E Coupled oscillations
- F Polarimeter
- G Interference – air wedge
- H Resolving power
- I Michelson interferometer

Sessional Assessment :

1	Practicals	40 marks.
2	Records	10
	Total	: 50

VIII SEMESTER B.Sc.Ed.

8.6 # P-8: PHYSICS THEORY

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES: To provide a basic understanding of molecular, nuclear and condensed matter physics

COURSE CONTENT:

UNIT 1 : MOLECULAR PHYSICS

Molecular formation, electron sharing, The H_2^+ molecular – ion, H_2^- molecule, complex molecules, rotational energy levels, vibrational energy levels, Raman and IR spectra, electronic spectra of diatomic molecules

UNIT 2 : ATOMIC NUCLEUS

Nuclear structure, nuclear constituents, Basic properties of nucleus – charge, mass, spin and shape, Nuclear magnetic moment, Nuclear forces, stable nuclei, Segre chart, nuclear radii, packing fraction and binding energy
Liquid drop model of the nucleus, shell model, meson theory of nuclear forces.

UNIT 3: RADIO ACTIVITY AND PARTICLE PHYSICS

Radioactive decay, half-life, mean life, activity, decay constant, Radioactive displacement laws, Theory of alpha-emission (non-quantum mechanical), Geiger-Nuttall law, Range of alpha particles, Beta decay, beta ray spectra, neutrino hypothesis, Gamma ray emission, pair production, Internal conversion, Radioactive dating, Biological effects of radiation, units of radiation exposure, Nuclear fission and fusion, energy production in stars, Nuclear reactors

Particle Physics Classification of elementary particles and their interactions, conservation laws, Quarks, Structure of hadrons

UNIT 4 : CRYSTAL STRUCTURE AND THERMAL PROPERTIES OF SOLIDS

Crystal Structure Various types of bonding, cohesive energy and compressibility of ionic crystals, Madelung constant, Concepts of crystal lattice, Unit cell and Bravais lattice, Fundamental lattice systems and their types, Miller indices, some simple crystal systems with their coordination number and packing fraction – cubic systems

Thermal Properties Specific heat of solids, Einstein and Debye theories, vibrational modes of one-dimensional monoatomic system, lattice dispersion relation

UNIT 5 : ELECTRICAL & MAGNETIC PROPERTIES OF SOLIDS

Electrical Properties Free electron model of a metal, solution of one dimensional Schrodinger equation in constant potential, density of states, Fermi energy. Energy bands in solids, Kronig-Penney model (without mathematical derivation), Distinction between metals, semi conductors and insulators, Hall effect

Magnetic Properties: Langevin theory of dia and para magnetism, Curie-Weiss law, Qualitative description of ferromagnetism
Superconductivity Qualitative description, Critical temperature and Meissner effect

References:

- 1 Introduction to Modern Physics, Mani & Mehta
- 2 Perspectives of Modern Physics, Beiser
- 3 Modern Physics, R Murugesan
- 4 Nuclear Physics, Kaplan
- 5 Atomic and Nuclear Physics, Subramanyam & Brijlal
- 6 Nuclear Physics, Gopalakrishnan
- 7 Concepts of Nuclear Physics, Cohen
- 8 Solid State Physics, A J Dekker
- 9 Introduction to Solid State Physics, C Kittel

Sessional Assessment : 2 Tests OR 1 Test and 1 assignment.

VIII SEMESTER B.Sc.Ed

8.6 # P-8P : PHYSICS PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To develop the ability to set up apparatus, to collect and analyze data to determine the desired physical quantity

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)
Experiments on

- A Magnetic susceptibility
- B e/m of electrons
- C Rutherford model
- D G M tube
- E Millikan oil drop
- F Planck's constant
- G Energy gap of a semiconductor
- H Fermi energy

- I Rydberg constant
- J Hall effect

Sessional Assessment :

1.	Practicals	40 marks
2	Records	10
	Total	: 50

I SEMESTER B.Sc.Ed.

1.6 # C-1 : CHEMISTRY THEORY

Contact Hrs per Week:3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES: To develop an understanding of principles of Atomic Structure and Chemical Bonding

COURSE CONTENT:

UNIT 1 : ATOMIC STRUCTURE I

Origin of atomic theory, Chemical equation, stoichiometric calculations Electrical nature of matter, Thomson's experiment, Milliken's experiment The structure of the atom, Rutherford's model, Origins of quantum theory, black body radiation, Planck's hypothesis, Photoelectric effect Bohr's model of atom, derivation of the expression for the energies of hydrogen atom – hydrogen spectrum

UNIT 2 : ATOMIC STRUCTURE II

Elements of quantum mechanics, wave nature of electron, de Broglie's hypothesis, uncertainty principle Schrodinger equation, particle in a box, wave equation of hydrogen atom (explanation of the terms), wave functions of hydrogen atom, quantum numbers and their significance, radial probability curves, angular probability densities of orbitals of hydrogen, Multielectron atoms, Pauli's exclusion principle, Hund's multiplicity rule, Slater's rule to determine effective nuclear charge, screening effect, energy level diagrams for multielectron atoms

UNIT 3 PERIODIC TABLE AND PERIODICITY

Classification of elements into s, p, d and f blocks Atomic radius, covalent, ionic and Van der Waal's radii – explanation with examples Variation of covalent radii in a group and a period, explanation for the observed trends Comparison of the size of atoms with the corresponding anions and cations Ionisation energy – factors influencing ionisation energy in a group and

period Electron affinity – variation in a group and period Electronegativity – variation in a group and period Relationship between electronegativity, ionisation energy and electron affinity. Pauling's scale of electronegativity

UNIT 4 : CHEMICAL BONDING – I

Covalent bond, Valence bond approach, formation of hydrogen molecule, potential energy curve, σ and π bonds, polarity of covalent bond, polarisation, Fajan's rule, polar and non-polar molecules Hybridisation (involving s, p and d orbitals), examples Geometry of molecules Bond angles, bond lengths and bond energies Valence Shell electron pair repulsion theory (VSEPR), effect of lone pairs, prediction of geometry using VSEPR theory Molecular orbital theory – LCAO method - examples of homonuclear diatomic molecules of 1st and 2nd period Molecular orbital treatment for heteronuclear molecules NO, CO and HCl

UNIT 5 : CHEMICAL BONDING II

Ionic bond, factors favouring the formation of ionic bonds, lattice energy, Born-Haber cycle, Calculation of lattice energy of ionic solids like NaCl, KCl Properties of ionic solids Metallic bond, general properties of metals, Conductivity, lustre, malleability Theories of bonding in metals, Valence bond theory, Band-theory, Conductors, insulators and semiconductors, super conductivity, Hydrogen bond, nature of hydrogen bond, inter and intra molecular hydrogen bond, effect of hydrogen bond on physical properties Importance of hydrogen bonding in biological molecules

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment

References:

- 1 University Chemistry Bruce Mahan
- 2 Concise Inorganic Chemistry . J D Lee
- 3 Modern Inorganic Chemistry R D Madan
- 4 Principles of Inorganic Chemistry Puri and Sharma
- 5 An Introduction to Inorganic Chemistry Mackay and Mackay
- 6 Inorganic Chemistry Manku

I SEMESTER B.Sc.Ed.

1.6 # C-1P : CHEMISTRY PRACTICALS

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

OBJECTIVES: To strengthen the concepts of mole and stoichiometry To develop analytical skills of estimation through titrimetry

COURSE CONTENT:

TITRIMETRY

a) *Acidimetry and alkalimetry*

- 1 Titrations using strong acid – strong base, strong base-weak acid and strong acid-weak base
- 2 Estimation of Na_2CO_3 and NaHCO_3 in a mixture
- 3 Estimation of NH_3 in an ammonium salt by back titration

b) *Redox titrations*

- 4 Estimation of ferrous iron using KMnO_4
- 5 Estimation of oxalic acid using KMnO_4
- 6 Estimation of ferrous iron using $\text{K}_2\text{Cr}_2\text{O}_7$ with an internal and external indicators
- 7 Standardisation of sodium-thiosulphate using potassium dichromate and estimation of iodine
- 8 Estimation of copper in a copper salt by iodometry

c) *Complexometry*

- 9 Standardisation of EDTA solution using ZnSO_4 and determination of Mg or Ca

Sessional Assessment :

1	Periodic evaluation of skills, accuracy of measurement/Identification	30 Marks
2	End of Semester Test	10
3	Records	10
Total		: 50

References:

- 1 A Text Book of Quantitative Inorganic analysis, A I Vogel

II SEMESTER B.Sc.Ed.

2.6 # C-2 : CHEMISTRY THEORY

Contact Hrs per Week:3
Exam Duration: 3 Hrs

Max Marks : 100
Sessional : 20
Terminal : 80

OBJECTIVES: To develop an understanding of properties of gases, liquids and solutions To develop an understanding of the periodic trends, preparation, properties and uses of s and p block elements and their compounds in terms of structure and bonding

COURSE CONTENT:

UNIT 1: GASEOUS STATE

Review of gas laws and ideal gas equation. Kinetic theory of gases, derivation of the equation Distribution of molecular speeds – mean, root mean and most probable speeds, numerical problems. Heat capacity of gases Imperfect gases – intermolecular forces, Van der Waal's equation, virial equation, transport phenomena, viscosity, mean free path, effusion and diffusion

UNIT 2 : LIQUIDS AND SOLUTIONS

Properties of liquids – viscosity, surface tension, their determination Raoult's law, the ideal solution, colligative properties of solutions, determination of colligative effects and calculations involving these properties Abnormal colligative effects, association and dissociation Vapour pressure, effect of temperature on vapour pressure Completely miscible liquid pairs – vapour pressure, composition and distillation diagrams, Azeotropes Fractional solubility of partially miscible liquid pairs, Critical solution temperature Vapour pressure and distillation of immiscible liquid pairs, Steam distillation, Henry's law, Nerst distribution law

UNIT 3 : s-BLOCK ELEMENTS

Similarities and gradation in physical properties like atomic and ionic radii, ionisation energies, electropositive character, reducing properties Colouration to the flame, formation of ionic compounds, hydration of ions, hydration energy Polarizing power of metal ions Similarities and gradation in chemical properties, reactivity, formation of oxides, hydroxides and halides Action of liquid ammonia Properties of solutions of s-block elements in liquid ammonia, colour, electrical conductivity, and reducing power Nature of Carbonates, bicarbonates and nitrates Anomalous properties of lithium and beryllium, Diagonal relationship between Li and Mg, Be and Al

UNIT 4 : p-BLOCK ELEMENTS

A comparative study of p-block elements groupwise and periodwise in terms of electronic structure with respect to properties of elements, ionisation energy, oxidation states, inert-pair effect Relationship between the structure and properties of allotropes of Carbon, Phosphorous, Sulphur. Differences in properties of the first element and the rest in groups Extraction of Be and Pb

UNIT 5 : COMPOUNDS OF NON TRANSITION ELEMENTS

Preparation, properties and structure of the following - Boron hydrides, Boron nitride, Boron halides, Carbides – Salt like, covalent. Silicates – ortho, pyro, cyclic chain sheet and 3-dimensional silicates Polyphosphates, long chain and cyclosilicates Phosphazenes and cyclo phosphazenes Oxides, oxoacids of N, P and S Oxo acids of halogens Inter halogen compounds, Compounds of noble gases

Sessional Assessment. 2 Tests OR 1 Test and 1 Assignment

References:

- 1 SI Nos 1 to 6 of First Semester
- 2 Principles of Physical Chemistry Maron and Prutton
- 3 Elements of Physical Chemistry Glasstone and Lewis
- 4 Physical Chemistry P W Atkins
- 5 Physical Chemistry Kundu and Jain
- 6 Principles of Physical Chemistry Puri and Sharma

II SEMESTER B.Sc.Ed.**2.6 # C-2P: CHEMISTRY PRACTICALS**

Contact Hrs per Week-3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To develop the skills of measurement and understanding of the physical properties of liquids and solutions To develop the skills of preparing some inorganic compounds and understanding their properties

COURSE CONTENT:

- 1 Density of pure liquids
- 2 Viscosity of pure liquids and solutions
- 3 Surface tension of pure liquids and solutions
- 4 Boiling points, melting points, freezing points of pure substances and mixtures
- 5 Vapour pressure of pure liquids and solutions
- 6 Refractive index of pure liquids and mixtures
- 7 Studies on some properties of elements and compounds to elucidate periodic trends

Sessional Assessment: Same as in I Semester

References:

1. Practical Physical Chemistry, A Findlay.
2. Experimental Physical Chemistry, Das and Behara

III SEMESTER B.Sc.Ed.

3.6 # C-3 : CHEMISTRY THEORY

Contact Hrs per Week.3
Exam Duration: 3 Hrs

Max Marks : 100
Sessional : 20
Terminal : 80

OBJECTIVES: To understand the principles of equilibrium and energetics

COURSE CONTENT:

UNIT 1 : CHEMICAL THERMODYNAMICS – I

Definition of thermodynamic terms – system, surroundings, types of systems, properties of systems Thermodynamic equilibrium processes – cyclic, isothermal, adiabatic, isochoric, isobaric, reversible, irreversible Work, heat, energy – definition, derivation of mathematical expression for work done in reversible, isothermal expansion of an ideal gas Reversible process and maximum work Conservation of energy – The first law of thermodynamics, Statement and mathematical form, enthalpy of a system, heat capacity of a gas at Constant Volume (C_v) and Pressure (C_p), relationship between C_p and C_v Thermodynamic behaviour of ideal gas in isothermal and adiabatic processes The Joule-Thomson effect, Joule-Thomson coefficient – derivation, sign and its significance, Inversion temperature, Carnot cycle, thermodynamic efficiency

UNIT 2 : THERMODYNAMICS – II

Thermochemistry – measurement of enthalpy of a reaction, heat of reaction at constant volume and pressure Thermochemical equations – Calculation of ΔE and ΔH Standard enthalpy changes – types of enthalpy changes, enthalpy of formation, enthalpy of combustion, enthalpy of hydrogenation, enthalpy of neutralisation, enthalpy of solution, enthalpies of formation of ions in solution Thermochemical laws – Lavoisier and Laplace law, Hess's law of constant heat summation, bond energies, variation of heat of reaction with temperature The second law of thermodynamics – spontaneous processes, statement and explanation of second law, conversion of heat into work, concept of entropy and its mathematical formulation Relationship between energy and entropy, entropy change for reversible process, irreversible process and phase transitions, entropy changes in isothermal and adiabatic expansion of an ideal gas, variation of entropy with pressure and volume

UNIT 3: THERMODYNAMICS – III

The third law of thermodynamics, evaluation of absolute entropies, Free energy and equilibrium – The Helmholtz and Gibbs free energy – mathematical expressions, properties and significance of free energy changes in a process, calculation of free energy changes, Statistical mechanics – basic ideas, thermodynamic probability of a system, the most probable distribution of particles in a system The partition function, Boltzmann distribution law, mathematical expression for the energy of a system

UNIT 4 : CHEMICAL AND IONIC EQUILIBRIUM

Nature of chemical equilibrium, equilibrium constant, significance of equilibrium constant, external effect on equilibria – pressure, concentration and temperature, LeChatelier's principle, calculations involving equilibrium constant Ionic equilibria in aqueous solutions, sparingly soluble salts, solubility product, common ion effect, selective precipitation, applications in qualitative analysis

Acids and Bases – Arrhenius, Lowry-Bronstead and Lewis concepts, strengths of acids and bases, ionisation of water, pH scale, weak acids and bases, hydrolysis, Buffer solution, acid-base indicators, acid-base titrations, multistage equilibria

UNIT 5 : PHASE EQUILIBRIA

Clausius Clapeyron equation – its applications, definition and explanation of the terms, number of components, number of phases and number of degrees of freedom Statement and explanation of phase rule, one component systems, the phase diagrams of water and sulphur, phase diagrams of two component systems comprising of solid-liquid, solid-solid systems Simple eutectic, systems forming compounds with congruent melting points

Sessional Assessment. 2 Tests OR 1 Test and 1 assignment

References:

1 SI No 1 of First semester and SI Nos 2 to 6 of Second Semester

III SEMESTER B.Sc.Ed.

3.6 # C-3P: CHEMISTRY PRACTICALS

Contact Hrs per Week:3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

OBJECTIVES: To study equilibrium properties and determine equilibrium constants To make thermochemical measurements and calculate thermodynamic properties

COURSE CONTENT:

- 1 Characterization of equilibrium
- 2 Changing equilibrium concentrations
- 3 Equilibrium constants of reactions in solutions
- 4 Distribution coefficient
- 5 Thermochemical measurements – Heat of combustion, solution and neutralization, calorific values
- 6 Acid-Base equilibria

- a) pH determination using indicators
 - b) Buffer solutions and determination of pK of indicators
 - c) Hydrolysis
- 7 Temperature effects on
 - a) Vapour pressure of solutions/liquids
 - b) Equilibrium constants – Calculations of ΔH , ΔG and ΔS of reactions
- 8 Determination of Critical solution temperature

Sessional Assessment : Same as in I Semester

References: Same as in II Semester practicals

IV SEMESTER B.Sc.Ed.

4.6 # C-4 : CHEMISTRY THEORY

Contact Hrs per Week:3
Exam Duration: 3 Hrs

Max Marks : 100
Sessional : 20
Terminal : 80

OBJECTIVES: To develop an understanding of principles of chemical kinetics, laws of photochemistry, To introduce nomenclature, structure, reactivity and stereochemistry of organic compounds

COURSE CONTENT.

UNIT 1 : CHEMICAL KINETICS – I

Order and molecularity of reactions Rate laws – derivation of integrated rate equations for zero, first, second, third and nth order reactions Time for fractional change Examples of first, second and third order reactions Determination of order of reactions – graphical and analytical methods, using integrated rate equations, fractional life method and isolation method, Kinetics of complex reactions – derivation of rate equation of opposing, consecutive and parallel reactions

UNIT 2 : CHEMICAL KINETICS – II

Influence of temperature on rate of reactions – Arrhenius equation, derivation of Arrhenius parameters, energy of activation Energy of activation and significance Collision theory of bimolecular reactions, collision theory of unimolecular reactions – Lindemann mechanism, steady state approximation, theory of absolute reaction rate – thermodynamic treatment Catalysis – theories of catalysis, Intermediate compound theory Enzyme catalysis – Michaelis-Menton law

UNIT 3 : PHOTOCHEMISTRY

Photochemistry – Grothus – Drapper, Beer-Lambert and Stark-Einstein laws
Quantum yield, reasons for very high and very low quantum yields Rate
equation for decomposition of hydrogen iodide Qualitative treatment of
hydrogen-chlorine reaction Photosensitized gas reactions, photochemical
reactions in liquid phase, flash photolysis Fluorescence and
phosphorescence, chemiluminescence - Explanation and examples

Adsorption: Physical and Chemical Derivation of Langmuir adsorption
isotherm. Statement and explanation of BET and Gibb's isotherms
Determination of surface area of adsorbent using Langmuir equation
Adsorption theory of catalysis using Langmuir equation

UNIT 4 : INTRODUCTION TO ORGANIC CHEMISTRY

Bonding in carbon compounds, bond angles, bond energies and bond
distances IUPAC nomenclature

Structure and reactivity of molecules – simple electronic effects – inductive,
resonance and steric effects Theory of resonance, fixation of double bonds
in fused ring systems. Huckel $4n+2$ rule, non benzenoid aromatic compounds
– cyclopropenium salts, cyclopentadienyl cation, tropylium ion and ferrocenes

UNIT 5 : STEREOCHEMISTRY

Stereochemistry and stereoisomerism, optical activity and plane polarized
light Experimental determination of optical activity, enantiomerism and
tetrahedral carbon, chirality, configuration, representation and nomenclature
of stereoisomers – R,S – conventions Diastereoisomers, meso structure,
generation of chiral centers – synthesis and optical activity, resolution of
racemic mixtures, asymmetric synthesis Stereoisomerism of alkenes – E, Z
conventions Conformation of acyclic compounds, representation of three
dimensional molecules, restricted rotation about C-C bond Conformation of
cyclic compounds – cyclopentane and cyclohexane Conformation of mono
and disubstituted cyclohexanes

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment

References

- 1 Principles of Physical Chemistry by Maron and Prutton (India Book House)
- 2 Elements of Physical Chemistry by Glasstone and Lewis (MacMillan)
- 3 Physical Chemistry, IV Edition - P W Atkins (ELBS)
- 4 Organic Chemistry, VI Edition, - Morrison and Boyd (Prentice Hall)
- 5 Organic Chemistry, VI Edition – I L Finar, Vol I (ELBS).
- 6 Organic Chemistry, Seyhan N Ege, III Edition (AITBS, Delhi)

IV SEMESTER B.Sc.Ed.

4.6 # C-4P : CHEMISTRY PRACTICALS

Contact Hrs per Week:3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES:

To study the rates of reactions and effects of temperature and medium on rates

COURSE CONTENT:

- 1 Rates of reactions – order and rate constants of some reactions
 - a) Acid hydrolysis of an Ester – Titrimetry
 - b) Iodination of acetone – Titrimetry
 - c) Peroxydisulphate – Iodide reaction – Titrimetry and Clock technique
 - d) Base hydrolysis of an Ester – Titrimetry and Conductometry
 - e) Solvolysis of t-butyl chloride – Titrimetry and pH metry
 - f) Inversion of cane sugar – Polarimetry
- 2 Temperature and medium effects on rates
- 3 Calculation of thermodynamic parameters

Sessional Assessment: Same as in First Semester.

References : Same as in Second Semester.

V SEMESTER B.Sc.Ed.

5.8 # C-5 : CHEMISTRY THEORY

Contact Hrs per Week. 3
Exam Duration: 3 Hrs

Max Marks : 100
Sessional : 20
Terminal : 80

OBJECTIVES: To develop an understanding of the Chemistry of functional groups and mechanisms of organic reactions

COURSE CONTENT:

UNIT 1 : AROMATIC AND ALIPHATIC HYDROCARBONS

Alkanes – nomenclature, IUPAC names of alkanes, Industrial source, preparations, reactions Halogenation – mechanism of halogenations, relative reactivities of alkanes toward halogenation, orientation and reactivity, reactivity and selectivity Cycloalkanes – nomenclature, industrial source, preparation and reactions, reactions of small ring systems, relative stabilities of cycloalkanes Stereoisomerism in cyclic compounds – conformational analysis

Alkenes – Structure of alkenes, nomenclature, industrial source, preparation – dehydrohalogenation, dehydration of alcohols, dehalogenation and catalytic hydrogenation of alkynes E_1 and E_2 elimination reaction mechanisms, Evidence for E_1 and E_2 mechanisms, E_1 reaction and orientation Reactions of alkenes – hydrogenation, addition of halides, hydrogen halides, sulphuric acid and diborane Electrophilic addition mechanism and stereochemistry Free radical addition – peroxide effect Reactions of alkenes with oxygen electrophiles – ozone – ozonolysis, permanganate and peroxy acids

Dienes – Structure, property and stability of conjugated dienes Electrophilic addition to conjugated dienes – 1,2 vs 1,4 additions

Alkynes – Structure of alkynes, nomenclature, Industrial source, preparation and reactions Acidity of alkynes, electrophilic addition reactions of alkynes Aromatic hydrocarbons – Structure, stability and reactions of benzene, aromatic electrophilic substitution and effect of substituents – mechanism of nitration, halogenation, sulphonation and Friedel-Craft's reactions Preparation and properties of naphthalene-electrophilic substitution in naphthalene

UNIT 2 : ALKYL AND ARYL HALIDES

Structure of alkyl halides, classification and nomenclature, preparation of alkyl halides, reactions of alkyl halides – nucleophilic aliphatic substitution – SN_1 and SN_2 mechanisms Evidences and stereochemistry. Effect of substrate structure, leaving group, nucleophiles and solvent on the reactivity in SN_1 and SN_2 reactions SN_1 mechanism and neighbouring group participation mechanism

Aryl halides – Structure, preparation and reactions Electrophilic substitution in aryl halides Nucleophilic aromatic substitution – bimolecular displacement mechanism, reactivity in aromatic substitution, evidence for the two steps in bimolecular displacement, elimination – addition mechanism for nucleophilic aromatic substitution – Benzyne mechanism.

UNIT 3 : ALCOHOLS, PHENOLS & ETHERS

Alcohols – Structure, classification, nomenclature, industrial source, ethyl alcohol, preparation of alcohols – Bouveault-Blanc reduction – mechanism, Lithium aluminium hydride reduction of aldehydes, ketones and esters, sodium borohydride reduction of α carbonyl compounds, mechanism of

reduction, Hydroboration and oxidation, mechanism of hydroboration, Grignard synthesis of alcohols. Reactions of alcohols – cleavage of C – OH bond and C – O – H bonds, relative reactivities of primary, secondary and tertiary alcohols, oxidation of alcohols. Preparation and properties of 1,2 – diols and glycerol

Phenols – Structure, nomenclature and classification. General methods of preparation, properties of phenols – mechanism of Reimer-Tiemann reaction, Kolbe-Schmitt reaction, Lederer-Manasse reaction, electrophilic substitution in phenols

Ethers – Preparation of ethers, cyclic ethers and epoxides. Cleavage reactions of ethers. Electrophilic substitution in aromatic ethers, examples of crown ethers and uses of crown ethers

UNIT 4 : ALDEHYDES AND KETONES

Structure of carbonyl group, carbonyl compounds as acid and bases, nomenclature of aldehydes and ketones. General methods of preparation of aldehydes and ketones. Nucleophilic addition reactions in carbonyl compound, acetals, ketals, Aldol condensation, aldol types of condensations, Knoevenagel, perkin, benzoin condensations. Michael addition, Wittig reaction, Organo metallic reagent addition to carbonyl compounds, Reformatsky reaction. Preparations and properties of formaldehyde, acetaldehyde, acetone, acetophenone and benzophenone

UNIT 5 : CARBOXYLIC COMPOUNDS & AMINES

Carboxylic Compounds and their Derivatives. Structure of carboxylic acid and their derivatives, nomenclature of carboxylic acids, amides, esters, acid chlorides and anhydrides. Acidity of carboxylic acids. Preparation of carboxylic acids, conversion of carboxylic acids to esters, amides, acid anhydrides and acid chlorides. Reactions of carboxylic acids. Mechanism of esterification and hydrolysis. Reactions of organo metallic reagents with carboxylic acid and their derivatives. Reduction of carboxylic acids and their derivatives. Preparation and properties of formic acid, acetic acid, tartaric acid, citric acid, benzoic acid, cinnamic acid and salicylic acid

Amines. Structure, classification and nomenclature of amines. Industrial source, preparation – reduction of nitro compounds, ammonolysis of halides, reductive amination, Hofmann degradation of amides. Synthesis of secondary and tertiary amines. Reactions of amines – structure and basicity, effect of substituents on basicity of aromatic amines, quaternary ammonium salts – exhaustive methylation, Hofmann orientation, ring substitution in aromatic amines, reaction with nitrous acid. Diazonium salts – preparation and reactions. Coupling reactions of diazonium salts – synthesis of azo compounds and dyes

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment

References

- 1 Organic Chemistry, Seyhan N Ege, III Edition (AITBS, Delhi)
- 2 Organic Chemistry, Morrison and Boyd, VI Edition (Prentice Hall)
- 3 Organic Chemistry, I L Finar, Vol I, VI Edition (ELBS)
- 4 Organic Chemistry, Hendrickson, Cram and Hammond, III Edition (McGraw Hill)
- 5 Organic Chemistry, Stanley H. Pine, IV Edition (McGraw Hill)

V SEMESTER B Sc.Ed.

5.8 # C.5P : CHEMISTRY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To evolve scheme of analysis of organic compounds based on the properties of functional groups, To identify organic compounds based on the scheme of analysis

COURSE CONTENT:

Qualitative organic analysis

Sessional Assessment: Same as in First Semester.

Reference : Text Book of Qualitative Organic Analysis by A I Vogel.

VI SEMESTER B.Sc.Ed.

6.8 # C-6 : CHEMISTRY THEORY

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks : 100
Sessional : 20
Terminal : 80

OBJECTIVES: To classify solids based on bonding characteristics and to acquire the knowledge of methods of determining the structure of solids To explain the properties of d and f block elements and their compounds in terms of their electronic configurations and bonding To understand the properties of coordination compounds in terms of bonding theories (CFT,

VBT) To understand the importance of coordination compounds in biological systems and in catalytic processes To familiarise with the applications of nuclear reactions

COURSE CONTENT:

UNIT 1 : d AND f BLOCK ELEMENTS

Electronic configuration and position in the periodic table – ionisation potentials, variable oxidation states, formation of coloured compounds, magnetic properties, paramagnetism, diamagnetism, ferromagnetism and antiferromagnetism, formation of complexes, catalytic properties, occurrence of lanthanides, oxidation states, causes and consequences of lanthanide contraction – colour and magnetic properties of lanthanide M^{3+} ions, formation of complexes Extraction of lanthanides from monazite – separation of lanthanides – ion exchange and solvent extraction methods Minerals and ores – concentration of ore, calcination, roasting, reduction of roasted ore, electrolytic reduction, refining of metals Extraction of Cu, Ni, Fe, Th and U Steel and alloy steels

UNIT 2 : COORDINATION COMPOUNDS

Coordination compounds – types of ligands, nomenclature of complex compounds, Isomerism in coordination compounds – ionisation, hydrate, linkage and coordination isomerism Stereoisomerism of coordination compounds with coordination numbers 4 and 6 Stability of complex compounds – thermodynamic and kinetic stability, factors affecting the stability, stability constant, chelate effect, valence bond theory – inner and outer orbital complexes Crystal field theory – d-orbital splitting in tetrahedral, tetragonal and octahedral fields, weak and strong ligand fields, crystal field stabilisation energy Jahn-teller distortion, explanation of magnetic properties and colour of the complexes, magnetic susceptibility measurement – Guoy method Molecular orbital theory – elementary treatment of octahedral compounds with and without π bonds

UNIT 3 : ORGANOMETALLIC COMPOUNDS AND BIOINORGANIC CHEMISTRY

Definition and Classification, nomenclature, bonding in organometallic compounds such as ferrocene, dibenzene-chromium, Zeisse' salt, Wilkinson catalyst Application of organometallic compounds Bioinorganic chemistry – role of metal ions in biological systems, biochemistry of Haemoglobin and Myoglobin Sodium and potassium pump, Biochemistry of magnesium and calcium

UNIT 4 : CONDENSED PHASES

Solid state – crystal symmetry, Symmetry elements, Symmetry operations, Point groups, law of interfacial angles, law of rational indices, Miller indices Space lattice and unit cell – Bravis lattice, crystal systems, detailed study of simple body centred and face centred cubic systems, coordination number, calculation of Avagadro number X-ray and crystal structure – derivation and application of Bragg equation, identification of type of cubic crystal, crystallographic data structure of NaCl and KCl. Rotation crystal method and

powder method Hexagonal and cubic close packing, voids and their coordination number, extrinsic and intrinsic electric conductivity of solids
Semi conductors – n and p types and n-p junctions

UNIT 5 : NUCLEAR CHEMISTRY

Natural radioactivity, modes of decay, units of radioactivity, kinetics of decay, half-life and average life, radioactive equilibrium, disintegration series, artificial radioactivity, nuclear reactions

Structure of nucleus, composition of nucleus, nuclear forces, Meson theory, nuclear stability, n/p ratio mass defect and binding energy, nuclear models – liquid drop model, shell model, nuclear fission, nuclear fusion

Application of radioactivity – rock dating, radiocarbon dating, neutron activation analysis, isotope dilution analysis, Tracer techniques, production of transuranium elements, determination of solubility of sparingly salts, elucidation of reaction mechanisms, radiochromatography, applications in medicines and agriculture, tracer techniques

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment

References:

- 1 SI Nos 2 and 6 of I Semester
- 2 SI Nos 2 to 6 of II Semester
- 3 Inorganic Chemistry, Cotton and Wilkinson
- 4 Inorganic Chemistry, James Huheey
- 5 Theoretical Inorganic Chemistry, Day and Selbin

VI SEMESTER B.Sc.Ed.

6.8 # C-6P: CHEMISTRY PRACTICALS

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

OBJECTIVES: To evolve a scheme of analysis of anions and cations based on solubility products and common ion effect To identify cations and anions in a mixture based on the scheme of analysis and chemical properties of ions
To prepare some coordination compounds to study its properties

COURSE CONTENT:

- 1 Classification of anions and cations
- 2 Qualitative inorganic analysis of mixtures containing four radicals
- 3 Preparation of two coordination compounds and studying their properties

Sessional Assessment: Same as in I Semester

References:

- 1 Inorganic Qualitative Analysis, A I Vogel
- 2 Practical Inorganic Chemistry, Gurthu and Kapoor

VII SEMESTER B.Sc.Ed.

7.10 # C.7 : CHEMISTRY THEORY

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks : 100

Sessional : 20

Terminal : 80

OBJECTIVES: To develop an understanding of equilibrium and electrochemistry, To familiarize with molecular rearrangement and concerted reactions

COURSE CONTENT:

UNIT 1 : ELECTROCHEMISTRY-1

Electrolytic conduction and Electronic conduction, conductivity, Factors affecting conductivity, equivalent and molar conductance, their relation with conductivity Numerical problems pertaining to conductivity, equivalent and molar conductivity Variation of conductivity and molar conductance with dilution Idea of strong and weak electrolytes and Ostwald dilution law, Kohlrausch law of independent migration of ions Application of Kohlrausch law, Ionic product of water, Dissociation constant of weak electrolytes, solubility of a sparingly soluble salt, conductometric titrations Qualitative idea of Debye Huckel theory of strong electrolytes Debye Huckel Onsager equation and its experimental verification Transport number and its determination

UNIT 2 . ELECTROCHEMISTRY-2

Concept of Electrode Potential, Nernst electrode potential equation, types of electrodes, metal-metal Ion Electrode, metal-metal insoluble salt and Ion electrode, gas electrode, redox electrode and amalgam electrode Standard Hydrogen Electrode (SHE), calomel electrode and silver electrode, evaluation of potential of a single electrode and significance of the concept of standard electrode potential

UNIT 3 : ELECTROCHEMISTRY-3

Electrolytic and Electro Chemical Cells, Expression for the emf of a cell, standard Cell (Weston's), numerical problems related to the determination of emf of cells, Gibbs Helmholtz equation, concentrations cells with transference

and without transference, expression for the emf of concentration cell
Applications of emf measurements, potentiometric titrations, determination of solubility product constant of a salt, measurement of pH of a solution using hydrogen electrode, glass electrode and quinhydrone electrode, Determination of transport numbers of ions using concentration cell, determination of liquid junction potential and mean activity coefficient of an electrolyte

UNIT 4 : ELECTROCHEMISTRY-4

Concept of over voltage and polarization Polarography, application of the technique of polarography Power generation and storage, primary and secondary cells Functioning of acid and alkali battery Fuel cells, Dry cell and its functioning Corrosion as electrode process and Inhibition of corrosion, Passivity and theories of passivity

UNIT 5 : MOLECULAR REARRANGEMENT & CONCERTED REACTIONS

General discussion of electron deficient skeletal rearrangements – direction and stereochemistry of rearrangement, migratory aptitudes or preferences – pinacol-pinacolone, Hofmann, Curtius and Beckmann rearrangements

Introduction to concerted reactions – examples of concerted reactions, theory of concerted reactions, review of π -molecular orbitals, interactions between molecular orbitals, cycloaddition reactions of carbon compounds – photochemical dimerisation, molecular orbital picture of Diels – Alder reaction, electrocyclic reactions, sigmatropic reactions – Cope and Claisen rearrangement

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment.

References

- 1 Principles of Physical Chemistry by Maron and Prutton (India book House)
- 2 Elements of Physical Chemistry by Glasstone and Lewis (MacMillan)
- 3 Physical Chemistry by P W Atkins, IV Edition (ELBS)
- 4 Organic Chemistry by Morrison and Boyd, VI Edition (Prentice Hall)
- 5 Organic Chemistry by Seyhan N Ege, III Edition (AITBS, Delhi)

VII SEMESTER B.Sc.Ed.

7.10 # C-7P : CHEMISTRY PRACTICALS

Contact Hrs per Week:3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To study the effect of various factors like nature of the electrolyte, dilution, temperature etc on conductivity To develop skills of measurement of conductance, pH and electromotive forces

COURSE CONTENT:

- 1 To study the effect of dilution on molar conductivity of weak and strong electrolytes
- 2 Conductometric titration
- 3 Construction and measurement of emf of cells
- 4 Potentiometric titrations

Sessional Assessment: Same as in First Semester.

References : Same as in Second Semester.

VIII SEMESTER B.Sc.Ed.

8.5 # C-8 : CHEMISTRY THEORY

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks : 100
Sessional : 20
Terminal : 80

OBJECTIVES: To understand the principles of spectroscopy and to elucidate the structures of organic compounds To familiarize students with descriptive organic chemistry in the areas of natural products, synthetic drugs, vitamins, carbohydrates, macro molecules and biochemistry

COURSE CONTENT:

UNIT 1 : SPECTROSCOPY AND STRUCTURE

Electromagnetic spectrum, absorption of electromagnetic radiation by organic molecules Infrared spectroscopy – units of frequency, wave length, and wave number, molecular vibrations, factors influencing vibrational frequencies, essential features of infrared spectrometer, sampling techniques,

using infrared spectroscopy to study chemical transformations, Infrared spectra of alkynes, alkenes, alcohols, aldehydes, ketones, carboxylic acids and esters.

Ultra Violet and Visible spectroscopy – the chromophore concept, absorption laws, UV-Visible spectrometer - essential features, types of electronic transitions, absorption and intensity, application of UV – Visible spectroscopy – conjugated dienes, α , β - unsaturated carbonyl compounds and benzene and its substituted derivatives

Nuclear magnetic resonance spectroscopy – NMR phenomenon, theory of nuclear magnetic resonance, chemical shift, factors influencing chemical shifts, chemical shift and molecular structure, spin-spin coupling, coupling constants and spin decoupling

Mass spectroscopy – principles, essential features of mass spectrometer Molecular ions, important fragmentation pathways, rearrangement of molecular ions, fragmentation associated with functional groups

UNIT 2 : HETEROCYCLIC COMPOUNDS

Nomenclature, structure and aromaticity of five and six membered, monocyclic and bicyclic heterocyclic compounds containing one and two hetero atoms Pyrrole, furan, and thiophene – general discussion and comparison with one another and with benzene compounds. Electrophilic attack at carbon atoms, relative reactivities of the three five membered heterocycles, relative activities of α and β positions, addition reactions and reaction with nucleophilic reagents Synthesis of pyrrole and its derivatives – Paal-Knorr synthesis, Knorr pyrrole synthesis and Hantzsch synthesis Indole-Fischer indole synthesis, Synthesis of thiophene and its derivatives Synthesis of Furan and its derivatives – Paal-Knorr synthesis, from aceto acetic ester and Feist-Benary synthesis Pyridine-electrophilic addition to nitrogen, electrophilic substitutions at carbon Comparison of the reactivities of pyridine, benzene and nitrobenzene. Nucleophilic substitution at carbon Synthesis of pyridine and its derivatives – Hantzsch pyridine synthesis, from 1,5 diketones and ammonia, from β -dicarbonyl compounds and cyano acetamide Synthesis and reactions of fused heterocycles – Quinoline and isoquinoline – Skraup synthesis, Bischler-Napieralski reaction and Pictet-Spengler reaction Importance of heterocyclic compounds in medicine and biochemistry

UNIT 3 : CHEMISTRY OF NATURAL PRODUCTS AND SYNTHETIC DRUGS

Alkaloids – General introduction, pharmacological importance, isolation and general methods of determining the structure Structural elucidation and synthesis of coniine, nicotine, piperine and atropine

Terpenoids – Introduction, isoprene and special isoprene rules, isolation and general methods of structural determination Structural elucidation and synthesis of citral, geraniol, menthol, menthone and camphor

Vitamins – Introduction, classification, general feature and physiological functions Structures of vitamin A, thiamin, riboflavin, nicotinic acid, pyridoxine, pantothenic acid, vitamin C and vitamin D

Drugs – Structure and synthesis of sulpha drugs – sulpha pyridine, sulphathiazole, sulphadiazine and sulphaguanidine Antimalarials – plasmaquin, mepacrine and chloroquin Antibiotics – Structures and pharmacological importances of antibiotics – penicillin, cephalosporin, streptomycin, chloromphenicol, terramycin and erythromycin

UNIT 4 :

Carbohydrates Definition and classification Monosaccharides – glucose and fructose - properties and structural elucidation, stereo isomers of glucose, lengthening and shortening of aldoses, conversion of aldose to ketose and vice versa Epimerisation, mutarotation, determining the ring size in aldoses using periodic acid, methylation followed by hydrolysis Families of aldoses – absolute configuration Disaccharides and polysaccharides – Maltose, Cellobiose, lactose and sucrose Starch – structure of amylose and amylopectin Cellulose – structure and uses of derivatives

Macromolecular Chemistry Macromolecules, polymers and polymerization – chain reaction polymerization, step-reaction polymerization, free-radical vinyl polymerization, co-polymerisation, Ionic polymerization – cationic polymerization and anionic polymerization Co-ordination polymerization Polymerisation reaction with controlled stereochemistry – stereochemical regularity in polymer structure, heterogeneous catalysis – Ziegler-Natta catalyst Step-growth polymerization – polyamides and polyesters, polyurethanes and epoxy resins Structure and properties of macro molecules

UNIT 5: BIOCHEMISTRY

Amino acids, Proteins and Nucleic acids – Structure and properties of amino acids – structure and stereochemistry of amino acids, amino acids as acids and bases, classification of amino acids found in proteins Determination of the structure of peptides and proteins – degradation of proteins into polypeptides and amino acids Nomenclature of peptides, end group analysis of peptides and proteins Synthesis of peptides and proteins – protection of reactive functional groups, activation of the carboxy group and formation of peptide bonds, solid-phase peptide synthesis Conformation of peptides and the structure of proteins Conjugated proteins, prosthetic groups and co-enzymes Secondary structure of proteins, mechanism of enzyme action – Chymotrypsin Nucleoproteins and nucleic acids Chemistry and heredity - genetic code

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment

References

- 1 Organic Chemistry, Morrison & Boyd, VI Edition (Prentice Hall).
2. Organic Chemistry, I L Finar, Vol I, VI Edition (ELBS).

- 3 Organic Chemistry, I L Finar, Vol II, V Edition (ELBS)
- 4 Application of absorption spectroscopy of organic compound, John R Dyer (Prentice Hall).
- 5 Spectrometric identification of organic compound, R M Silverstein et al , (John Wiley & Sons)
- 6 Organic Spectroscopy, William Kemp (ELBS)
- 7 Fundamentals of Molecular Spectroscopy, C N Banwell, III Edition (IMH)

VIII SEMESTER B.Sc.Ed.

8.5 # C-8P : CHEMISTRY PRACTICALS

Contact Hrs per Week:3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

OBJECTIVES: To develop skills of synthesis and estimation of organic compounds

COURSE CONTENT:

- 1 Two step organic synthesis involving halogenation, nitration, oxidation, reduction, acylation, hydrolysis and diazotisation
- 2 Isolation of organic compounds from natural sources
- 3 Organic quantitative estimations – phenols, anilines, alcohols, acetone, formaldehyde and glucose
- 4 Gravimetric analysis of – lead, iron and nickel

Sessional Assessment: Same as in First Semester.

References :

- 1 Text Book of Organic Synthesis, A I Vogel
- 2 Text Book of Qualitative Organic Analysis, A.I Vogel
- 3 Text Book of Qualitative Inorganic Analysis, A.I Vogel

I SEMESTER B.Sc.Ed.

1.8 # B-1: BOTANY THEORY – 'Algae and Protophyta; Virus and Bacteria'

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVE : To acquaint students with lower plants

COURSE CONTENT:

ALGAE

UNIT 1 :

A general account of the classification, occurrence, distribution, structure, vegetative, asexual and sexual reproduction, life-history, evolutionary relationships and economic importance of the following classes in general and genera in particular

Cyanophyceae *Oscillatoria*, *Nostoc* and *Scytonema*

UNIT 2 :

Chlorophyceae *Volvox*, *Hydrodictyon*, *Oedogonium*, *Cladophora*, *Coleochaete*, *Zygnema* and *Chara*

UNIT 3 :

Xanthophyceae *Vaucheria*, Bacillariophyceae A general account of diatoms

UNIT 4 :

Phaeophyceae *Ectocarpus* and *Sargassum*, Rhodophyceae *Polysiphonia*

UNIT 5 :

Virus and bacteria

General account of bacteria and viruses- history, occurrence, morphology, structure, reproduction and economic importance

Sessional Assessment: 2 Tests OR 1 Test and 1 assignment

References:

- 1 Text Book of Algae by Venkateswaralu (Maruthi Book Depot, Guntur)
- 2 Text Book of Algae by Sarkar
- 3 Text Book of Algae by Kumar & Singh (Affiliated East West Press, New Delhi)
- 4 A class book of Algae by Chopra (S Nagin & Co, Jullundhar)
- 5 A text book of Algae by J S Gupta
- 6 A text book of Algae by H D Kumar

- 7 A text book of Botany – The Algae by B P Pandey (Sultanchand, New Delhi)
- 8 Algae by N D Kamat
- 9 Algae by R.S Rattan (Schobanalal Nagin, Delhi)
- 10 College Botany – Vol 2 by Gangulee and Kar (New Central Book Agency, Calcutta)
- 11 Plant virus by Kenneth Smith (Methulm)
- 12 A text book of fungi, bacteria and viruses by H C Dubey
- 13 Cryptogamic Botany Vol I By Smith G M (McGraw Hill)

I SEMESTER B.Sc.Ed

1.8 # B-1P: BOTANY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES To develop the skills of identification and classification of lower plants, usage of microscope, drawing, dissecting and mounting, observation of materials, mounting

COURSE CONTENT:

- 1 Identification and study of the specimens included in theory
- 2 Making temporary micro preparations of the specimens
- 3 Identification of permanent micro preparations
- 4 Study of bacterial and viral diseases – citrus canker and tobacco mosaic virus
- 5 Study of permanent micro preparations of Bacteria – Grams staining

Sessional Assessment:

1 Identification of temporary micro preparations of materials	10 marks
2 Periodic evaluation of skills and attitudes	30
3 Records	10
Total	50

II SEMESTER B.Sc.Ed.

2.8 # B-2: BOTANY THEORY- ' FUNGI AND BRYOPHYTES '

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVE: To acquaint students with lower plants

COURSE CONTENT:

FUNGI:

UNIT 1:

A brief account of the classification and structure of the thallus, vegetative, asexual and sexual modes of reproduction and economic importance of the following classes in general and genera, in particular

UNIT 2:

a) Myxomycetes *Stemonites*, b) Phycomycetes *Saprolegnia*, *Albugo* (*Cystopus*) and *Phytophthora*, *Rhizopus*

UNIT 3 :

a) Ascomycetes Yeast (*Saccharomyces*), *Penicillium* and *Peziza* ,
b) Basidiomycetes *Ustilago*, *Puccinia* and *Agaricus* , General account of lichens and types – Crustose, Foliose, Fruticose, Diseases caused by some of the members mentioned above, the symptoms and various control measures

BRYOPHYTES:

UNIT 4 :

Occurrence, distribution, classification, Morphology, anatomy, reproduction and life history of the following genera Hepaticopsida – *Marchantia* and *Porella*

UNIT 5 :

Anthocerotopsida -*Anthoceros* , Bryopsida - *Funaria*

Sessional Assessment: 2 Tests OR 1 Test and 1 assignment

References:

- 1 College Botany Vol II by Gangule and Kar (Central Book Agency, Calcutta)
- 2 Introduction to Fungi by C J Alexopoulos
- 3 Text Book of Fungi for degree courses by Venkateswarlu (Maruthi book Depot, Guntur)
- 4 Fungi by Rai and Sharma (kitab mahal, Allahabad)

- 5 Introduction to Fungi by Srivastava J P (Central Book Depot, Allahabad)
- 6 A class book of fungi by Chopra (S Nagin & CO, Jullundhar)
- 7 Plant pathology by Walker (McGraw Hill)
- 8 Fungi and plant diseases by Mundkar (Macmillan co, Calcutta)
- 9 A text book of fungi, bacteria and viruses by H C DUBEY
- 10 Cryptogamic Botany Vol II by G.M Smith (McGraw Hill)
- 11 Introduction to Embryophyta (Vol 1-Bryophyta) by N S Parihar (Central Book Depot, Allahabad)
- 12 Bryophytes for degree courses by Venkateswarlu (Maruthi Book Depot, Guntur)

II SEMESTER B.Sc.Ed.

2.8 # B-2P : BOTANY PRACTICALS

Contact Hrs per Week. 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To develop the skills of observation, identification and classification of lower plants, drawing, dissecting plant parts and mounting, freehand section- cutting and staining

COURSE CONTENT:

- 1 Identification and study of the specimens included in Theory
- 2 To make temporary micro preparations of the specimen
- 3 To study the symptoms of the diseases caused by *Albugo*, *Phytophthora*, *Penicillium*, *Ustilago* and *Puccinia*
- 4 To identify permanent micro preparations

Sessional Assessment: Same as in I Semester.

III SEMSTER B.Sc.Ed.

3.8 # B-3 : BOTANY THEORY – Pteridophytes and Gymnosperms

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES To acquaint students with the study of Geologic time scale and the evolution of plants through ages starting from the most primitive

organisms to the advanced ones in order to facilitate understanding of the organisms of the past, the process of fossilization, to familiarize students with evolution and evidences of organic evolution To acquaint students with 2 groups of vascular plants

COURSE CONTENT:

UNIT 1 :

Occurrence, distribution, classification, morphology, anatomy, reproduction and life history and phylogeny of the following genera. General account of geologic time scale, evolutionary changes in organic life through ages fossilization process and uses of fossils

UNIT 2:

PTERIDOPHYTES: Psilophytopsida *Rhynia*, *Psilotum* , Lycopsida *Lepidodendron*, *Lycopodium*, *Selaginella* , Sphenopsida *Equisetum*

UNIT 3 :

Filicopsida *Ophioglossum*, *Osmunda*, *Pteridium*, *Marsilea*

UNIT 4 .

GYMNOSPEMS Cycadopsida *Cycadeoidea*, *Cycas*

UNIT 5 :

Coniferopsida , *Pinus* ; Chlamydospermopsida *Gnetum*

Sessional Assessment: 2 Tests OR 1 Test and 1 assignment

References:

1. Cryptogamic Botany Vol II by Smith (McGraw Hill)
2. Text book of Pteridophytes by V Venkateswarlu (Maruthi Book Depot, Guntur)
3. The Morphology of Pteridophytes by K R Sporne (Hutchinson, London)
4. Introduction to Embryophyta (vol II Pteridophyta) by N S Parihar (Central Book Depot, Allhabad)
5. An introduction to Pteridophyta by A.Rashid
6. A text book of Botany -vol II –Pandey, Misra and Trivedi
7. Gymnosperms- A treatise by O P Sharma (Pragati Prakashan, Meerut)
8. Botany for Degree students –Vol V –Gymnosperms by P C Vasistha (SULTANCHAND, Delhi)
9. A text book of Botany – Gymnosperms by B P Pandey (Sultan Chand, Delhi)
10. Morphology of Gymnosperms by K R Sporne (Hutchinson, London)
11. Cytology, Genetics and Evolution by K. Periaswamy (Emkay Publications, Delhi)
12. Introduction to Palaeo-botany by Arnold (McGraw Hill)
13. Gymnosperms by G L Chopra (S Nagin & Co , Jullundhar)
14. Gymnosperms by Vasishta (Sultanchand, Delhi)

III SEMESTER B.Sc.Ed.

3.8 # B-3P : BOTANY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To develop skills of observation, identification and classification of lower plants, plant parts and amounting, free hand section cutting and staining

COURSE CONTENT:

- 1 Identification and study of the structure of the specimen included in theory
- 2 Making temporary micropreparation of the specimens and their parts
- 3 Identification of permanent micro preparations
- 4 Preparation of at least 5 double stained permanent slides of the pteridophytes and gymnosperms

Sessional Assessment :

1	Period Evaluation of skills/attitudes	20 Marks
2.	Evaluation of double stained temporary micro preparations	20
3	Records	10
	Total	50

IV SEMESTER B.Sc.Ed.

4.8 # B-4 BOTANY THEORY – “ Embryology, Anatomy of Angiosperms and Bio-technology”

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES To equip students with a thorough knowledge of the embryology and anatomy of seed plants

COURSE CONTENT:

EMBRYOLOGY.

UNIT 1 :

- (a) Flower Parts of flower and floral modifications for pollination
- (b) Microsporangium and male gametophyte Development of anther, wall layers, tapetal types, microsporogenesis, cytokinesis in microspore development, tetrad configurations, abnormal features of pollen and pollen embryosac, development of male gametophyte, structure of vegetative and generative cells and male gametes

UNIT 2 :

- c) Megasporangium and female gametophyte Development and types of ovules, variations in integument and micropyle, tenuinucellate and crassinucellate ovules, endothelium, hypostase, epistase, megasporogenesis, tetrad configurations, functional megaspore, monosporic, bisporic and tetrasporic embryo sacs and their variations, organization and ultrastructure of embryo sac, embryo sac haustoria

UNIT 3 :

- d) Fertilization Double fertilization, classification of styles, modes of entry of pollen tube into embryo sac types of syngamy
- e) Endosperm Types of endosperm and their development Nuclear endosperm in some plants belonging to Orchidaceae, Onagraceae and Proteaceae, variations in nuclear endosperm, in (i) *Adoxa* (ii) *Thesium*
- f) Embryo Types of embryogeny, development of Crucifer type, development of monocot embryo in *Luzulla*, suspensor modifications in some members of Leguminosae, Polyembryony

UNIT 4 :

ANATOMY.

- a) Cell wall Wall layers, chemical composition, thickenings and pits
- b) Meristematic tissue Characteristics, classification, apical meristems, intercalary and lateral meristems, theories of meristematic activity and vascular cambium
- c) Epidermis Structure and functions of stomata, trichomes and multiple epidermis
- d) Simple tissues Structure, functions, classification and ontogeny of parenchyma, collenchyma and sclerenchyma
- e) Vascular tissues Xylem-structure, primary and secondary xylem, cell types, growth rings, types of wood, phloem- structure, primary and secondary phloem and cell types
- f) Laticiferous tissue Occurrence, classification, structure and functions
- g) Internal anatomy of leaf, stem and roots- dicot and monocot(self-study)
- h) Secondary growth in stem and root(dicot), Periderm and Lenticels
- i) Anomalous secondary growth in *Bougainvillea* and *Dracaena*

UNIT 5 : BIOTECHNOLOGY

j) Experimental Embryology and Tissue Culture Brief history, culture procedure, anther culture, endosperm culture, embryo culture, protoplast culture and somatic hybridization

k) Introduction to Bio-technology and transgenic plants

Sessional Assessment: 2 Tests OR 1 Test and 1 assignment

References:

1. An Introduction to the Embryology of Angiosperms by P Maheshwari (Mc Graw Hill)
2. Embryology of Angiosperms by S S Bhojwani and S P Bhatnagar (Vikas Publishing House, Delhi)
3. From Flower to Fruit by B G L Swamy and K V Krishnamurthy (TATA Mc GRAW HILL, New Delhi)
4. Plant Anatomy by K. Esau (John Wiley)
5. Plant Anatomy by A Fahn (Pergamon Press, Oxford)
6. Plant Anatomy by B P Pandey (Sulthan Chand, New Delhi)
7. College Botany Vol By Gangulee and Kar (New Central Book Agency, Calcutta)
8. Anatomy of Seed Plants by K Esau (JOHN WILEY)
9. A text book of plant Anatomy by P C Vasishta (Pradeep Publications, Jullandar)

IV SEMESTER B.Sc.Ed

4.8# B-4P: BOTANY PRACTICALS

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

OBJECTIVES: To develop the skills of observation, drawing, dissecting plant parts and mounting; free hand section-cutting and staining, preparation of temporary slides

COURSE CONTENT:

- 1 To dissect and amount the embryo and endosperm of some plants
- 2 To study the development of microsporangium
- 3 In-vitro germination of pollen grains
- 4 To study the development of representative female gametophyte (monosporic-8 nucleate)
- 5 To study the types of ovules and placentations
- 6 To familiarise with the techniques of tissue culture
- 7 To study epidermal tissue system

- 8 To make temporary micropreparations of free-hand sections of leaves, stem and root and study of tissues
- 9 To study normal and anomalous secondary growth in plants
- 10 Maceration of wood and study of tracheids and vessels

Sessional Assessment : Same as in I Semester.

V SEMESTER B.Sc.Ed.

5.10 # B- 5 : Botany Theory – “ Taxonomy, Ecology, Plant Geography and Ethnobotany’

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks. 100
Sessional : 20
Terminal : 80

OBJECTIVES: To enable students to appreciate the history of taxonomy , botanical nomenclature and understand systematic botany of higher plants along with the economic importance of plants and their Ethnobotanical significance and their distribution

COURSE CONTENT:

TAXONOMY:

UNIT 1 :

Historical study of taxonomy – Development of taxonomic thought and classification, classification of Bentham and Hooker, Engler and Prantl, Principles of nomenclature – Binomial system of nomenclature,
Units of plant classification
b) Herbarium techniques importance of national and regional herbaria

UNIT 2 :

Detailed study of the following families

- 1 Dicotyledons- Polypetalae
 - i) Magnoliaceae, ii) Annonaceae, iii) Capparidaceae, iv) Cruciferae (Brassicaceae), v) Tiliaceae, vi) Sterculiaceae, vii) Malvaceae, viii) Leguminosae, ix) Rutaceae, x) Umbelliferae (Apiaceae)
- 2 Dictyledons- Gamopetalae
 - i) Apocynaceae, ii) Asclepiadaceae, iii) Solanaceae, iv) Acanthaceae, v) Labiatae, vi) Verbenaceae, vii) Rubiaceae, viii) Compositae (Asteraceae)

UNIT 3 :

- 3 Dictoyledons- Monochlamydeae
 - i) Amaranthaceae, ii) Euphorbiaceae

- 4 Monocotyledons
 ii) Liliaceae, ii) Orchidaceae, iii) Palmae, iv) Gramineae (Poaceae)

ECOLOGY AND PLANT GEOGRAPHY

UNIT 4 :

- Ecological factors- edaphic, climatic, physiographic and biotic factors, influence of factors on vegetation
- Ecosystem, concept of ecosystem, natural types and artificial types, importance of energy flow
- Plant succession Causes, process and types of plant succession, hydrosere and xerosere, plant communities and community dynamics
- Plants in relation to their environment, types of environment and its effect on the morphology and anatomy of plants hydrophytes, xerophytes, halophytes, epiphytes, parasites

UNIT 5 :

Vegetational types of India in general and vegetational types of Karnataka in particular

- Ecology crisis in the biological community and the physical environment, conservation of natural resources, conservation of forests, national and international efforts
- Environmental Pollution – Green house effect, global warming, ozone hole
- Endemism, Bio-diversity, hotspots of India

ETHNOBOTANY : Introduction to Ethnobotany, significance of Ethnobotany

Sessional Assessment: 2 Tests OR 1 Test and 1 assignment

References:

- The classification of flowering plants Vols I & II by A B Rendle (University Press, Cambridge)
- The families of the flowering plants by J Hutchinson (Clearendon Press, Oxford)
- An introduction to systematic Botany and Ecology by J N Mitra (World Press, Calcutta)
- Angiosperms 12th Edition by G L Chopra (S NAGIN & CO , Jullundhur)
- Flora of the Presidency of Madras Vols I,II & III by J S Gamble (Botanical Survey Of India, Calcutta)
- A Dictionary of flowering plants and Ferns VII Edition by J S Willis (UNIVERSITY PRESS, Cambridge)
- Taxonomy of vascular plants by G H M Lawrence (MacMillan)
- Plant systematics by A B Jones and A Luchsinger (McGraw Hill)
- Taxonomy of Angiosperms by Priti Shukla and Misra (Vikas Publishing House, New Delhi)
- Taxonomy of Angiosperms by P C Vasishta(Sultanchand, New Delhi)

V SEMESTER B.Sc. Ed.

5.10 # B-5P: BOTANY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES To develop the skills of collection and preservation of plants, drawing, dissecting plant parts and mounting, to identify and describe a flowering plant in technical terms and assign it to its respective taxonomic group and understanding their Ecology and Ethnobotanical importance

COURSE CONTENT:

- 1 To describe a given plant in technical terms
- 2 To refer a plant to its systematic position by studying the vegetative and floral parts
- 3 To identify the common plants available in Mysore
- 4 To draw floral diagrams
- 5 To write floral formulae
- 6 To recognize the botanical name and family of plants, morphology and uses of products of economic importance
- 7 Field trips(3-5 days) to a suitable forest for the study, collection and identification of angiosperms, submission of 10 herbarium sheets
- 8 Study of ecological anatomy of-hydrophytes, xerophytes, mesophytes, halophytes, epiphytes & Parasites
- 9 Chemical examination of soil for determining acidity and alkalinity
- 10 Importance value index calculation, quadrat, measurement of density, abundance of the plant community
- 11 Field trips to forests and different regions to study the vegetational types
- 12 Collection of Ethnobotanically important plants and study of Herbarium specimens and Museum specimens

Sessional Assessment .

1	Periodic evaluation of skills and attitudes	20 marks
2	Herbarium and sheets and field diary	20
3	Records	10
Total-		: 50

VI SEMESTER B.Sc.Ed.

6.10 # B-6: BOTANY THEORY-Plant physiology and Bio-chemistry

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES: To equip students with a thorough knowledge of the complex functioning of the plant physiology and their bio-chemical aspects

COURSE CONTENT:

UNIT 1 :

- a) Solutions Nature and types of solutions, concentration of solutions, molar solutions, molal solutions, percent solutions, normal solutions, buffer solutions, Hydrogen ion concentration
- b) i) Permeability of cell membranes
ii) Diffusion and diffusion pressure
iii) Osmosis Osmotic system, process of osmosis, Osmotic pressure, turgor pressure, diffusion pressure deficit (An attempt may be made to explain osmosis based on thermodynamic principles) plasmolysis, measurement of Osmotic pressure
iv) Imbibition Conditions necessary and the factors affecting rate of imbibition, imbibition pressure
- c) Absorption of water Water absorbing part of plant, types of water in soil and their availability to plants, water holding power of the soil, Mechanism and factors affecting absorption of water

UNIT 2:

- d) Ascent of sap Pathway of water in the plant, Xylem as a tissue suitable for translocation, mechanism of movement of water, root pressure, cohesion-tension hypothesis
- e) Transpiration Introduction, magnitude of transpiration, measurement of transpiration Stomatal structure and distribution, diffusive capacity of stomata, Physiology of stomatal action, role of light, pH ATP, K⁺ ions, CO₂ and temperature on stomatal movement Factors affecting the rate of transpiration in plants and related environmental factors, Significance of transpiration, guttation

UNIT 3 :

- f) Carbohydrates Introduction, classification of carbohydrates, monosaccharides Oligosaccharides and polysaccharides, transformation of carbohydrates, Phosphorylation, synthesis and degradation of sucrose and starch

- g) Enzymes Introduction, nature, nomenclature and classification of enzymes, Mechanism of action of enzymes, factors influencing rates of enzymatic reactions, Prosthetic group and coenzymes
- h) Translocation of solutes Paths of translocation-upward, downward and lateral, Evidences to show that translocation takes place through phloem, translocation rate and factors affecting translocation, mechanism of translocation- cytoplasmic structure and pressure flow hypothesis

UNIT 4:

- i) Nitrogen metabolism forms of nitrogen available to plants-nitrate nitrogen, organic nitrogen, molecular nitrogen, reduction of nitrates to ammonia, symbiotic and asymbiotic nitrogen fixation, nitrogen cycle, nitrogen conversions in the soil Synthesis of amino acids and amides, reductamination and transamination, Nucleic acids-Structure and properties, synthesis of nucleic acids

UNIT 5 :

- j) Proteins Classification, structure and synthesis of proteins, role of nucleic acids in protein synthesis-replication, transcription, genetic code, complementary Base-pairing, formation of peptides, break down of proteins
- k) Mineral nutrition Various mineral elements found in plants-major and trace methods of detection-ash analysis, sand and solution cultures, absorption of mineral salts, passive absorption-mass flow, diffusion, ion exchange, donnan equilibrium, active absorption-carrier concept, cytochrome pump hypothesis Translocation of mineral salts-upward, downward and lateral translocation Essentiality of mineral elements, functions of the elements-N,P,Ca,Mg,K,Fe,N and Zn their symptoms and deficiencies

Sessional Assessment: 2 Tests OR 1 Test and 1 assignment

References:

1. Plant physiology by Salisbury and Ross (BELMONT Indian Edition- Prentice Hall Of India, New Delhi)
2. Plant physiology by Devlin (Affiliated East West Press, New Delhi)
3. Plant physiology by Verma
4. Plant physiology by Kochhar
5. Plant physiology by Pandey and Sinha (Vikas Publishing House, New Delhi)
6. Plant physiology by Bidwell (MacMillan)
7. Plant physiology by Mayer and Anderson
8. Plant physiology by Noggle and Fritz (Prentice Hall Of India, New Delhi)
9. Principles of Biochemistry by A B Lehninger(CBS Publishers & Distributors, Delhi)

VI SEMESTER B.Sc.Ed

6.10 # B-6P· BOTANY PRACTICALS

Contact Hrs per Week 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To develop the skills of observation and preparation of reagents To experiment, collect and analyse the data and infer

COURSE CONTENT:

- 1 Preparation of different types of solutions- percent, molar, molal and normal solutions, buffer solutions
- 2 To study the effect of temperature and alcohol on the permeability of cell membrane
- 3 To demonstrate osmosis using egg membrane, onion peel, tomato peel, potato and carrot
- 4 To demonstrate plasmolysis using *Spirogyra* or lower epidermal peels of *Rhoeo*
- 5 To find out the osmotic potential of a cell-Plasmolytic method
- 6 To calculate water potential of cells using potato tuber
- 7 To compare the water holding capacity of different soils (clay, peat and sand)
- 8 To find out the rate of water absorption by plants
- 9 To demonstrate root pressure
- 10 To demonstrate the path of water in plants (Balsam)
- 11 To find out the structure of different types of stomata
- 12 Girdling experiments to show that water moves through xylem
- 13 Experiment to demonstrate the loss of water through aerial parts of plants (Bell Jar/ Polythene cover)
- 14 To calculate stomatal index and frequency in the upper and lower surface of leaves of different plants
- 15 Cobalt chloride paper experiment to show the rate of transpiration on the two surfaces of leaves
- 16 To demonstrate transpiration pull in plants
- 17 To compare the rates of transpiration under different environmental conditions using Ganong's Potometer
- 18 Measurement of rate of transpiration by finding the amount of water lost in 1 unit time (weight method)
- 19 To demonstrate the continuity of intercellular spaces in leaf
- 20 To study the activity of enzyme amylase in germinating seeds and the effects of pH and temperature
- 21 To test for the presence of carbohydrates-glucose, sucrose, starch, fats and protein in food materials
- 22 Separation of amino acids by paper chromatography
- 23 Ringing experiment to show the translocation of solutes
- 24 To observe cyclosis in *Vallisneria*

Sessional Assessment : Same as in I semester.

VII SEMESTER B.Sc.Ed.

7.9 # B-7 : BOTANY THEORY: 'Cytology, Genetics, Plant breeding and Economic Botany'

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES, To equip students with a through knowledge of the complex functioning of the plant cytology, to enable them to comprehend the interrelationship between plants and their physical and biological environment and vegetational types and Economic Botany of plants

COURSE CONTENT :

UNIT 1 : CYTOLOGY

- a) The cell, structure and functions of the parts and components of a generalized Cell
- b) Cell Wall and Plasma membrane, morphology, origin, ultra-structure and functions, interrelationships of membranes and cell organelles

UNIT 2 : CELL ORGANELLES

- i) The nucleus, significance, prokaryotes and eukaryotes, shapes and size of nucleus, Nuclear envelope, nucleolus, chromosomes, morphology, physical and chemical Nature, special types of chromosomes
- ii) Mitochondria Morphology, ultrastructure, chemical composition, origin and Function
- iii) Plastids, chloroplasts, leucoplasts and chromoplasts, function and origin

UNIT 3 : GENETICS

- a) Mendelism, Mendel's laws, monohybrid and dihybrid cross (Self-study)
- b) Interaction of genes, Incomplete dominance, complementary ratio, Supplementary ratio, epistasis
- c) Sex determination in plants
- d) Linkage and crossing over
- e) Chromosomal aberrations and polyploidy, deletion, duplication, translocation and inversion, polyploidy auto and allopolyploidy
- f) Gene concept, gene and DNA, recon, muton and cistron, operon model
- g) Gene mutations, Natural and artificial

UNIT 4 : PLANT BREEDING

Clonal selection Variety test, pedigree method, bulk method, hybridization Techniques, back and test cross methods, mutation breeding

UNIT 5 : ECONOMIC BOTANY

Distribution, botanical name, family, method of extraction and uses of the following

Oil, rubber, fibre, timber yielding and medicinal plants, cereals, pulses, spices and condiments and beverages

Sessional Assessment: 2 Tests OR 1 Test and 1 assignment

References:

- 1 Plant Physiology by Salisbury and Ross (Belmont Indian Edition Prentice Hall Of India, New Delhi)
- 2 Plant Physiology by Devlin (affiliated east west press, New Delhi)
- 3 Plant Physiology by Varma
- 4 Plant physiology by Kochhar
- 5 Plant Physiology by Pandey and Sinha (Vikas publishing house, New Delhi)
- 6 Plant Physiology by Bidwell (MaMillan)
- 7 Plant Physiology by Mayer and Anderson
- 8 Plant Physiology by Noggle and Fritz (Prentice Hall of India , New Delhi)
- 9 Fundamentals of biochemistry by J L Jain (Sultanchand, New Delhi)
- 10 Principles of Biochemistry by A L Lehninger (CBS Publishers & Distributors, Delhi)
- 11 Cytology, Genetics and Evolution by P K Gupta (Rastogi Publications, Meerut)
- 12 Cytology, Genetics and EVOLUTION BY K ERIASWAMY (Emkay publications, Delhi)
- 13 Text Books of Genetics by Dalela and Verma (Jaiprakashnath & Co , Meerut)
- 14 Principles of Genetics by Gardener (John Wiley)
- 15 Cytogenetics and plant breeding by Chandrashekar and Parasarathy (P Varadachar & Co , Madras)

VII SEMESTER B.Sc.Ed.

7.9 # B-7P: BOTANY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To develop the skills of observation, drawing free hand section cutting and staining, to develop appreciation of interaction of plants, animals and environment, to enable students to appreciate the need for conserving nature and natural resources

COURSE CONTENT:

- 1 Microscopic observation of cellular organelles
- 2 Training in fixing staining and squashing for cytological study
- 3 Study of stages of mitosis
- 4 Study of stages of meiosis
- 5 Preparation of fixative and stains and making permanent micropreparations for cytological studies
- 6 Observation of museum specimens of different cereals, pulses
- 7 Observation of museum specimens of different Rubber and Fiber yielding plants
- 8 Observation of museum specimens of different Species and condiments and medicinal plants
- 9 Observation of museum specimens of different Oil yielding plants
- 10 Observation of museum specimens of different Beverages

Sessional Assessment:

1	Periodic evaluation of skills and attitudes	20 marks
2	Identification of temporary micropreparation & materials	20
3	Records	10
	Total	50

VIII SEMESTER B.Sc.Ed.

8.7 # B-8: BOTANY THEORY –'Plant Physiology and Evolution

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES : To equip students with a thorough knowledge of the complex functioning of the plant, physiology and plant evolution

COURSE CONTENT :

PLANT PHYSIOLOGY

UNIT 1 :

a) **Photosynthesis** Introduction and history- Nature and function of pigments involved in photosynthesis, structure of chloroplast (molecular model may be discussed), light reaction of photosynthesis, absorption of light by the pigment molecules, photo-excitation, transfer of energy, photosynthetic unit break-down of water, release of oxygen and production of a reductant, Hill reaction, photo-ionisation, photosphorylation, Emerson effect, two pigment systems Dark reaction of photosynthesis products of CO₂ fixation, Calvin

Benson cycle, HSK pathway, C and C plants, photorespiration and its role in dry matter production; CO₂ fixation in succulent plants Measurement of photosynthesis, factors affecting photosynthesis and chemosynthesis

UNIT 2 :

b) **Respiration** Introduction respiratory quotient, ATP as an energy intermediate, glycolysis, formation of acetyl COA Krebs cycle, nature of biological oxidation, electron transport system, oxidative phosphorylation, energy relations of respirations, pentose phosphate pathway, fermentation, factors affecting respiration, measurement of respiration

c) **Morphogenesis** : growth, definition, cellular basis of growth, growth curves, differentiation, photo morphogenesis, effects of visible light on plant development; role of phytochromes in photomorphogenesis

UNIT 3 :

d) Plant growth regulators auxins, gibberellins and cytokinins, general account, physiological effects and their uses in agriculture and horticulture

e) Photoperiodism Introduction, importance of dark period and photoperiod, protoinductive cycles, perception of the photoperiodic stimulus, presence of floral hormone, light quality and photoperiodism, gibberellins and flowering response

UNIT 4 :

f) **Vernalization** Introduction, vernalization and flowering, site of vernalization and the transmission of vernalization stimulus, devernialization

g) **Dormancy**: Seed and bud dormancy, advantages of dormancy, causes and methods of breaking seed dormancy, bud dormancy, causes of bud dormancy, methods of breaking and inducing dormancy in buds

h) Plant growth movements classification and general account

UNIT 5 :

Evolution: Theories and evidences, Lamarckism and Neo-Lamarckism, Darwinism and Neo-Darwinism, Devries work on mutation

Sessional Assessment: 2 Tests OR 1 Test and 1 assignment

References:

- 1 Plant physiology by Salisbury and Ross(BELMONT) Indian Edition-Prentice Hall Of India, New Delhi)
- 2 Plant physiology by DEVLIN(Affiliated east west press, New Delhi)
- 3 Plant physiology by Varma
- 4 Plant physiology by Kochhar
- 5 Plant physiology by Pandey and Sinha(Vikas Publishing House, New Delhi)
- 6 Plant physiology by Bidwell (MacMillan)
- 7 Plant physiology by Mayer and Anderson
- 8 Plant physiology by Noggle and Fritz(Prentice Hall of India, New Delhi)
- 9 Fundamental of Biochemistry by J L Jain (Sultanchand, New Delhi)

- 10 Principles of Biochemistry by A L Lehninger(CBS Publishers & Distributors, Delhi)
- 11 Cytology, Genetics and Evolution by P K Gupta, (Rastogi Publications, Delhi)
- 12 Cytology, Genetics and Evolution by K Periaswamy (Emkay Publications, Delhi)
- 13 Text Book of Genetics by Dalela and Verma (Jaiprakashanth & Co , Meerut)
- 14 Principles of Genetics by Gardener(John Wiley)
- 15 Cytogenetics and Plant breeding by Chandrashekar and Parthasarathy (P.Varadachar & Co , Madras).
- 16 Cytology, Genetics and Evolution by K Periasamy (Emkay Publications, Delhi)
- 17 Introduction to Palaeobotany by Arnold (McGraw Hill)

VIII SEMESTER B.Sc.Ed.

8.7 # B-8P · BOTANY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES : To develop the skills of observation, preparation of reagents, to experiment, collect and analyse the data and infer, to solve problems in plant physiology

COURSE CONTENT.

- 1 To demonstrate that oxygen is evolved during photosynthesis
- 2 To compare the rate of photosynthesis under different conditions
- 3 To demonstrate the effect of different wavelengths of light on photosynthesis
- 4 To demonstrate that light is necessary for photosynthesis
- 5 To demonstrate that CO₂ is necessary for photosynthesis
- 6 To demonstrate that chlorophyll is necessary for photosynthesis
- 7 To demonstrate Hill reaction
- 8 Separation of chloroplast pigments by paper chromatography
- 9 Absorption spectrum of chlorophyll
- 10 Separation of chloroplast pigments by chemical method
- 11 Estimation of chlorophyll by colorimetry
- 12 To compare the processes of photosynthesis and respiration- bromothymol blue experiment
- 13 To study the distribution of growth in roots
- 14 To demonstrate apical dominance in plants
- 15 To study the effect of growth hormones on plant growth
- 16 To test the germinability of seeds with Tetrazolium
- 17 To measure growth by Arc indicator

- 18 To demonstrate geotropism and phototropism
- 19 Experiment to demonstrate aerobic respiration
- 20 Experiment to demonstrate anaerobic respiration
- 21 Experiment to demonstrate fermentation-Kuhne's vessel
- 22 To demonstrate the liberation of heat during respiration
- 23 Experiment to calculate RQ using Ganong's respirometer
- 24 To study the shape and size of starch grains

Sessional Assessment :

1	Periodic Evaluation of Skills and Attitudes	20 marks
2	Records	10
3	Experimental Observations	20
Total		: 50

I SEMESTER B.Sc.Ed.

1.9 # Z-1 : ZOOLOGY THEORY – 'INVERTEBRATA'

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks : 100
Sessional : 20
Terminal : 80

OBJECTIVES To enable students to understand invertebrates, the organizational hierarchies and complexities, the evolutionary trends in external morphology and internal structure, identification and classification with examples, To enable them to understand various modes of adaptations in animals

COURSE CONTENT:

UNIT 1: PROTOZOA

General characters of the Phylum, classification of the Phylum up to classes with examples, Host –parasite relationships, Brief outline of the life history of *Plasmodium* and *Entamoeba* with special emphasis on pathogenicity

UNIT 2: PORIFERA

General characters of the Phylum, classification of the phylum upto classes with examples,

Type study Sycon-External morphology and cellular organization, Skeleton in sponges Different types of skeletal systems in sponges, Canal System, A comparative account of Ascon, Sycon and Leucon types of canal systems and their significance

UNIT 3: COELENTERATA

General characters of the Phylum, classification of the phylum up to classes with examples

Type study Obelia- External morphology and alternation of generation,

Aurelia- External morphology and life cycle, Arrangement of mesenteries in

Metridium

UNIT 4: PLATYHELMINTHES

General characters of Phylum, Classification of the Phylum up to classes with examples,

Type study Planaria- Organization, Digestive, excretory and reproductive systems

UNIT 5 : GENERAL TOPICS

(a) Nutrition in Protozoa Autotrophic, Holozoic, Saprozoic and Parasitic modes, with one typical example, (b) Locomotion in Protozoa Infraciliary system of Paramecium and ciliary locomotion, Sol-Gel theory for Amoeboid movement Ultra-Structure of Flagellum, Flagellar and Euglenoid movement (c) Reproduction in Protozoa Asexual-Fission, budding, cysts formation, Sexual –Conjugation, autogamy and syngamy with reference to Paramecium

(d) Reproduction in Sponges, Asexual reproduction- Budding, gemmule formation and regeneration, Sexual Reproduction- Life cycle with reference to Amphiblastula and Parenchymula larvae. Affinities and systematic position of sponges, (e) Polymorphism in Coelenterata, (f) Brief account of corals, coral reefs and their formation, (g) Salient features of Ctenophora and their affinities, (h) Parasitic adaptations of Platyhelminthes (Morphological and Physiological) Host-parasite relationships

Sessional Assessment · 2 Tests OR 1 Test and 1 Assignment.

References:

- 1 Invertebrate Zoology by E L Jordon and P S Verma (Text) –Sulchand & Co , Delhi)
- 2 Invertebrate Zoology by J K Dhami and P S Dhami (Text)-Sulchand & Co , Delhi)
- 3 Invertebrate Zoology series (Protozoa to Echinodermat) by R L Kotpal (Text)- Rastogi Publication, Meerut)
- 4 A Textbook of invertebrate zoology by S N Prasad (Text)- (Kitab Mahal, Allahabad)
- 5 Life of invertebrates by Russel and Hunter (Macmillan)
- 6 Invertebrate Zoology by R D Barnes(W B SAUNDERS, Philadelphia)
- 7 A manual of Zoology, Vol 1 by Ekambara Ayyar (Vishwanathan, Madar)
- 8 The invertebrate series of L H Hyman(MCGRAW HILL)
- 9 A student's text book of zoology by Adam Sedgwick Vol II, II & III (Central Book Depot, Allahabad)
- 10 A Text book of zoology vol 1 by Parkar and Haswell (Macmillan)

I SEMESTER B.Sc.Ed.

1.9 # Z-1P : ZOOLOGY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To develop in the students the skills- of staining and mounting of materials (temporary and permanent), of dissection, display and labeling, Of preparation of cultures of invertebrates by using common culture methods, of lab observation of animals

COURSE CONTENT:

Practical 1: Preparation of cultures of *Paramoecium*, *Euglena* and *Amoeba*

Practical 2: Effect of various stimuli (physical and chemical) on the behaviour of *Paramoecium*

Practicals 3,4,5: Preparation of permanent mounting of a) Sponge spicules, b) Sertularia colony, c) Sponge gemmules, d) *Paramoecium*, e) *Obelia* colony, f) Rectal parasites

Practical 6. Study of Protozoan slides a) *Amoeba*, b) *Entamoeba*, c) *Foraminifera*, d) *Euglena*, e) *Trypanosoma*, f) *Plasmodium*, g) *Paramoecium*, h) *Paramoecium* conjugation

Practical 7. Study of specimens: a) Sycon, b) Horny sponge, c) Finger sponge, Study of slides a) TS Sycon, b) L S sycon, c) Different types of spicules, d) Sponge fibre, e) Sponge gemmule

Practical 8 Study of slides a) *Obelia* colony, b) *Obelia* medusa, c) *Pennaria*, d) *Tubularia*, e) T S of sea anemone, f) *Ephyra* larva

Practical 9 Study of specimens a) *Physalia*, b) *Porpita*, c) *Velella*, d) *Aurelia*, e) *Pennatulata*, f) *Zoanthus*, h) *Alcyonium*, e) *Metridium*

Practical 10 Study of corals a) *Madrepora*, b) *Meandrina*, c) *Gorgonia*, d) *Tubipora*, e) *Favia*, f) *Fungia*

Practical 11 Study of Specimens a) Planaria, b) Liver fluke, c) Tape worm, Study of slides a) T S of *Planaria*, b) T S of liver fluke, c) T S of Tape worm, d) Scolex of tape worm, e) Gravid proglottid of Tape worms

Sessional Assessment:

1	Practicals	30 marks
2	Report on Project Work (Practicals 1 & 2)	05
3	Permanent Slides (Practicals 3, 4 & 5)	05
4	Records	10
	Total	: 50

II SEMESTER B.SC.ED.

2.9 # Z-2 : Zoology Theory- ' Invertebrata'

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks : 100

Sessional : 20

Terminal : 80

OBJECTIVES: To enable students to understand in respect of invertebrates - the organizational hierarchies and complexities, the evolutionary trends in external morphology and internal structures, Identification and classification with examples, To enable them to understand various modes of adaptations in animals

COURSE CONTENT:

UNIT 1: ASCHELMINTHES

General characters of the Phylum, Brief account of Morphological peculiarities and pathogenesis of human nematodes a) *Ascaris*, b) *Ancylostoma*, c) *Dracunculus*, d) *Enterobius*, e) *Wuchereria*, f) *Trichinella spiralis*

UNIT 2: ANNELIDA

General characters of the Phylum, Classification of the Phylum up to classes with examples, External characters of *Nereis* and *Heteronereis* Details of parapodium, *Hirudinaria* External features, body wall, haemocoelomic and reproductive systems

UNIT 3: ARTHROPODA

General characters of the Phylum, classification of the Phylum up to classes with examples, Distinguishing characters of the following orders with common examples a) Orthoptera, b) Odonata, c) Hemiptera, d) Coleoptera, e) Lepidoptera, f) *Hymenoptera*.

Salient features and affinities of *Peripatus* (Assignment)

Prawn External Morphology Digestive, circulatory, respiratory, excretory and reproductive systems

Scorpion External morphology, respiratory and reproductive systems.

UNIT 4: MOLLUSCA

General characters of the Phylum, classification of the Phylum up to classes with examples,

Type study Fresh water mussel- External morphology, digestive, respiratory systems and life cycle

Pila-Digestive, respiratory, excretory and nervous systems

UNIT 5 : GENERAL TOPICS:

(a) Adaptations of digestive system of *Nereis*, *Pheretima* and *Hirudinaria*, for their food and feeding habits, (b) Comparative study of Nephridia and coelomoducts in *Hirudinaria*, *Nereis* and *Pheretima*, (c) Crustacean larvae and their importance (Nauplius, Zoea, Mysis and Megalopa larvae), (d) A general account of basic plan of mouth parts in insects, (e) Modifications of foot in Mollusca, (f) Comparative account of shell in mollusca

Sessional Assessment : 2 Tests OR 1 Test and 1 Assignment.

References :

- 1 Invertebrate Zoology by E L Jordon and P S Verma (Text) –Sulchand & Co , Delhi)
- 2 Invertebrate Zoology by J K Dhami and P S Dhami (Text)-Sulchand & Co , Delhi)
- 3 Invertebrate Zoology series (Protozoa to Echinodermat) by R L Kotpal (Text)- Rastogi Publication, Meerut)
- 4 A Text book of invertebrate zoology by S N Prasad (Text)- (Kitab Mahal, Allahabad)
- 5 A life of invertebrates by Russel and Hunter (MacMillan)
- 6 Invertebrate Zoology by R D Barnes(W B Saunders, Philadelphia)
- 7 A manual of Zoology, Vol 1 by Ekamberantha Ayyar (Vishwanathan, Madar)
- 8 Imm's General Text Book of Entomology Vol I & II by O W Richards and R G Davies (Chapman And Hall, London)
- 9 General and Applied Entomology by K K Nayar and T N Ananthakrishnan (Tata McGraw Hill, New Delhi)
- 10 The invertebrate series of L H Hyman(McGraw Hill)
- 11 A student's text book of zoology by Adam Sedgwick Vol II, II & III (Central Book Depot, Allahabad)
- 12 A Text book of zoology vol 1 by Parkar and Haswell (MacMillan)
- 13 Destructive and Useful Insects- Their habits and control by Metcalf and Flint(Tata McGraw Hill, New Delhi)

Practical 10: Dissection of Pila (i) External morphology (ii) Mounting of radula (iii) Nervous system

Practical 11: Dissection of fresh water mussel (i) External morphology (ii) Digestive system (iii) Mounting of pedal ganglia

Practical 12: Study of slides (i) T S of Fresh water mussel (ii) T S of ctenidium (iii) Glochidium larva

(Note: Students should collect, preserve, mount, identify, classify and submit 10 common insect belonging to different orders.)

Sessional Assessment:

1	Periodic assessment	30 Marks
2	Collection of specimens (10 insects belonging to different orders to be collected, preserved, mounted, identified, classified and submitted by the students)	10
3	Record	10
Total		: 50

III SEMESTER B.Sc.Ed.

3.9 # Z-3 ZOOLOGY THEORY – Echinodermata & Chordata

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks : 100

Sessional : 20

Terminal : 80

OBJECTIVES: To enable students to understand in respect of invertebrates and vertebrates the organisational hierarchies and complexities, the evolutionary trends in external morphology and internal structure Identification and classification with examples

To enable them to understand various modes of adaptations in animals

COURSE CONTENT.

UNIT 1: ECHINODERMATA

General characters of the Phylum and classification upto classes with examples

ASTERIAS(Star fish) External morphology, digestive, water vascular and haemocoelomic systems, Larvae and metamorphosis, Pedicellaria in Asterias

Echinoderm larvae and their significance (Auricularia, Bipinnaria, Doliolaria, Ophio- and Echinopluteus)

UNIT 2: CHORDATA

General characters of the phylum and classification upto classes with examples

UNIT 3: PROTOCHORDATA

Amphioxus External morphology, coelom and atrium, Digestive, respiratory, circulatory nervous, excretory and reproductive systems (sense organs), affinities of Amphioxus Herdmania External morphology, digestive, circulatory and reproductive systems Retrogressive metamorphosis of Ascidian tadpole

Balanoglossus External morphology, proboscis complex and coelom, digestive, circulatory and reproductive systems

Tornaria Larva and its significance

UNIT 4: CYCLOSTOMATA

Salient features of *Petromyzon* with special reference to external morphology, digestive, respiratory and circulatory systems

Structure and Zoological importance of Ammocoetes larva

Comparison of *Petromyzon* and *Myxine* with reference to external, digestive and respiratory systems

UNIT 5 PISCES

Scoliodon External morphology, digestive and circulatory, respiratory, nervous and urinogenital systems, sense organs

Salient features of lung fishes and their importance in the evolution of Amphibia, Accessory respiratory organs and air bladder in fishes, Migration of fishes

Sessional Assessment : 2 Tests OR 1 Test and 1 Assignment.

References

Sl.No.1,2,4 (TEXTS) and 7 of 1 Semester; and

- 5 A Text Book of Zoology Vol II by Parkar and Hasswel (MacMillan)
- 6 A Text Book of Zoology Vol II by R D Vidyarthi (Sultanchand & Co , Delhi)
- 7 Life of Vertebrates by J Z Young (Oxford University Press)
- 8 The Vertebrate Body by A S Romer (Vakils, Ferrer & Simons, Bombay)
- 9 Elements of Chordate Anatomy by Weichert (McGraw Hill)
- 10 Bird Migration by D R. Griffin (Doubleday, Garden City, USA)
- 11 Indian Fishes by Qureshi and Qureshi (Brij Brothers, Bhopal)
- 12 Protochordates by K S Bhatia
- 13 The Book of Indian Birds by Salim Ali
- 14 Hand Book of the Birds of India & Pakistan by Salim Ali, Ripley, Dillon (Oxford University Press, Delhi)
- 15 Echinoderms by David Nichols (Hotchinson University Library, London)

III SEMESTER B.Sc.Ed.

3.9 # Z – 3P : ZOOLOGY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES: To develop in the students the skills of staining and mounting of materials (temporary and permanent), of dissection, display and labelling, of collection, preservation, mounting, identification and labelling of collected specimens, field observation of animals

COURSE CONTENT:

Practical 1 · (A) study of the salient features of (I) Star fish (ii) Brittle star (iii) Clypeaster (iv) Sea cucumber (v) Sea Urchin,
(B) Mounting of Pedicellaria, (C) Slides of Echinoderm larvae (Bipinnaria, Echino and Ophiopluteus)

Practical 2 : (A) Study of *Amphioxus* (I) *Amphioxus* W M (ii) *Amphioxus* T S through pharynx (iii) *Amphioxus* T S through gonads (iv) *Amphioxus* T S through intestine (v) *Amphioxus* T S through caudal region,
(B) Study of (I) *Balanoglossus* T S through proboscis (ii) *Balanoglossus* T S through Collar (iii) *Balanoglossus* T S through trunk

Practical 3: Study of (i) Museum specimen of Ascidian (ii) Museum specimen of Petromyzon (iii) Slides of Doliolum and Salpa

Practical 4 · Study of Cartilaginous fishes (I) Scoliodon (ii) Stegostoma (iii) Zygaena, (iv) Eagle ray (v) *Narcine* (vi) *Pristis* (vii) Trygon (viii) Skate

Practical 5 : Dissection of Shark – Afferent Bronchial system

Practical 6 · Dissection of Shark – Efferent Bronchial system

Practical 7 · Dissection of Shark 5th & 7th Cranial nerves

Practical 8 . Dissection of Shark – 9th & 10th Cranial nerves

Practical 9 : Shark-Mounting of (a) Membranous labyrinth (b) Ampulla of Lorenzini (c) Scales (d) Mounting scales of bony fish, Study of dissected and displayed digestive and urinogenital systems of Scoliodon

Practical 10 : Bony fishes, (a) Exocoetus (b) Echeineis (c) Clarias (d) Syngnathus (e) Hippocampus (f) Eel (g) Belone (h) Hemiramphus (i) Flat fish (j) Didon (k) Tetradon (l) Ophiocephalus

Practical 11: Dissection and display of accessory, respiratory organs and air bladders in fishes

Sessional Assessment:

1 Periodic assessment	30 marks
2 Permanent/temporary mountings	10
3 Records	10
Total	: 50

IV SEMESTER B Sc.Ed.

4.9 # Z-4 : ZOOLOGY THEORY – ‘Vertebrata’

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks . 100
Sessional . 20
Terminal . 80

OBJECTIVES: To enable students to understand in respect of vertebrates – the organisational hierarchies and complexities, the evolutionary trends in external morphology and internal structure, Identification and classification with examples, To enable them to understand various modes of adaptations in animals

COURSE CONTENT:

UNIT 1: VERTEBRATA

General characters of Amphibia, Reptilia, Aves and Mammalia- Salient features and classification upto orders of class with examples

UNIT 2:

Brief account of Palaeognathae and Neognathae Salient features and affinities of Prototheria, Special features and adaptive radiations of Marsupialia, General Characters of Eutheria and Salient features of (a) Chiroptera (b) Primates (c) Cetacea & (d) Carnivora

UNIT 3 · COMPARATIVE ANATOMY

Frog, Calotes, Pigeon & Rat, Digestive system and associated glands, Respiratory system, Respiratory organs of fish (review) and above mentioned vertebrates Circulatory system Structure and evolution of hearts in vertebrates, Arterial system with reference to evolution of Aortic arches in Vertebrates

UNIT 4 . COMPARATIVE ANATOMY (CONTINUED)

Nervous System - Basic plan of nervous system (central, peripheral and autonomous), CNS – comparative account of brains in Vertebrates,

Detailed account of cranial nerves, brief account of spinal nerves, Study of sense organs- Comparative account of eye and ear of Pigeon & Rat Urinogenital system Structure and evolution of kidneys in vertebrates, structure of gonads in Frog and Rat, Evolution of Urinogenital ducts in Vertebrates,
Skeletal system - Study of skulls, vertebrae, limb bones and girdles in – Frog, Varanus, Fowl and Rabbit

UNIT 5 · GENERAL TOPICS

Evolution of temporal fossae and arcades, Identification of poisonous and non-poisonous snakes of India, Poison apparatus and types of venom, adaptations of birds for the aerial mode of life, Migration of birds, Dentition in Mammals

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment

References: Same as in III Semester

IV SEMESTER B.Sc.Ed

4.9 # Z-4P ZOOLOGY PRACTICALS

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks · 50

Sessional 50

Terminal . Nil

OBJECTIVES To develop in the students the skills – of staining and mounting of materials (temporary and permanent), of dissection, display and labelling, of microtechniques (fixing, embedding, section cutting, staining and mounting), of collection, preservation, mounting, identification and labelling of collected specimens, of field observation of animals

COURSE CONTENT:

Practical 1:

(a) Study of digestive system from dissected specimens of Frog, Calotes, Pigeon and rat (b) Study of slides of , (i) T S of stomach (ii) T S of intestine (iii) T S of Liver (iv) T S of pancreas of frog or rat

Practical 2.

(a) Dissection of Arterial system of Frog (b) Mounting of Squamous and ciliated epithelium

Practical 3·

(a) Dissection of Venous system of Frog (b) Mounting of Cartilage (hand section of femur) Muscle fibres, nerve fibres

Practical 4 :

(a) Dissection of cranial nerves V & VII in Frog (b) Mounting of Brain of Frog

Practical 5 :

(a) Dissection of IX & X Cranial nerves in Frog

Practical 6

Study of specimens, (a) Amphibia (i) Hyla (ii) Rhacophorus (iii) Bufo (iv) Ichthyophis (v) Salamander ,
(b) Reptilia, (i) Draco (ii) Varanus (iii) Cobra (iv) Krait (v) Hydrophis (vi) Dryophis (vii) Rat Snake (viii) Viper

Practical 7 : Dissection of Arterial system in Calotes

Practical 8 Dissection of Venous system in Calotes

Practical 9. Dissection of Arterial system in Rat

Practical 10 :

Osteology (a) Study of skulls of – Frog, Calotes, Pigeon and Rabbit (b) Types of vertebrae in Frog, Bird and Rabbit

Practical 11:

(a) Pectoral and Pelvic girdles of Frog, Bird and Rabbit (b) Limb bones of Frog, bird and Rabbit

Practicals 12, 13 & 14: Microtechniques, Block marking, section cutting, staining, mounting and submission of 5 permanent slides of any five of (i) stomach (ii) intestine, pancreas (iv) kidney (v) testis (vi) Ovary of frog or Rat (The report on field studies includes the study of 15 common birds and 10 mammals (visit to a zoological garden)

Sessional Assessment:

1	Periodic assessment	25 marks
2	Report on field studies (15 common Birds & 10 mammals to be reported)	05
3	Stained permanent slides	10
4	Records	10
	Total	50

V SEMESTER B.Sc.Ed.

5.11 # Z-5: ZOOLOGY THEORY – 'Animal Ecology & Ethology'

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks : 100

Sessional : 20

Terminal : 80

OBJECTIVES: To enable the students to understand the energy sources, flow of energy and conservation, to understand the recycling of minerals and nutrients in ecosystems, to understand the dynamics of population, to understand causes of pollution and suggest measures, to understand behavioural patterns in animals

COURSE CONTENT:

ANIMAL ECOLOGY

UNIT 1 :

a) Definition, scope and applications of Ecology, b) Ecosystem Energy flow in Ecosystem Energy flow diagrams and their interpretation trophic levels and types of pyramids productivity, the methods of determining primary production, Biogeochemical cycles in ecosystem, Carbon, Nitrogen, Phosphorus and Sulphur Cycles, Cycling of organic nutrients and recycling pathways (brief account), c) Limiting factors Laws of limiting factors Liebig's law of minimum and Shelford's law of Tolerance Factor compensation and Ecotypes, d) Biotic community, concept of biotic community community structure, succession, climax community, Ecotone

UNIT 2 .

Population Ecology Definition of Population, species and population, Population Attributes Density, Natality, Mortality, age distribution, dispersal and dispersion, Cyclic oscillation, Home range and territory, Environmental resistance and carrying capacity of a population Interactions between populations Competition- Inter and intra specific, Mutualism and commensalism concept of a Niche Gauze Principle

UNIT 3 :

Habitat Ecology Marine Habitat Zones of a marine habitat and the associated community with reference to Plankton, Nekton and Benthos Fresh water Habitats Lake and its stratification, Adaptations of organisms of a lotic community Nature of a terrestrial habitat and the major difference between an aquatic and terrestrial habitat

UNIT 4.

Applied Ecology Pollution-Definition and classification- pollutants of air, water and soil, their effects on the ecosystem and Man, Radio active pollution of the Biosphere, control of pollution, Conservation ecological crisis and conservation of the environment. Conservation of wildlife and

natural resources (brief), National parks and sanctuaries, National and international efforts for conservation of wild life

UNIT 5. ETHOLOGY (BEHAVIOURAL ECOLOGY)

a) Ethology- Aims and Methods Contribution of Lorenz, Tinbergen and Klopfer, b) Biological clocks and control of Behaviour of animals, c) Stereotype behaviour; d) Taxes, reflexes, Instinctive and Motivational Imprinting and critical period in Imprinting, e) Social behaviours with special reference to Birds and Mammals(Primates), A short account of Aggressive behaviour in animals.

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment

References:

- 1 Fundamentals of Ecology by E P Odum (Text)-W B Saunders, Philadelphia)
- 2 Basic Ecology by E P Odum (Holt, Rinehart & Winston, New York)
- 3 Ecology by S K Charles(Text)-(Prentice Hall Of India, New Delhi)
- 4 Animal Behaviour by V G Dethier and E Stellar (Text)-(Prentice hall of India, New Delhi)
- 5 Current Problems in Animal Behaviour by W H Thorpe and L Zangwill (Text)
- 6 Experimental Animal Behaviour-A selection of Lab Exercises by H Hansell and J J Aitken (Text)-(Blakie & Sons, Glasgow)
- 7 The study of Instinct by N Tinbergen
- 8 The Dancing Bees by K V Frisch
- 9 Learning and Instincts in Animals by W H Thorpe and W Homan

V SEMESTER B Sc.Ed

5.11 # Z-5P : ZOOLOGY PRACTICALS

Contact Hrs per Week. 3
Exam Duration: Nil

Max Marks : 50
Sessional . 50
Terminal Nil

Practicals 1-4 : Chemical analysis of pond water, Estimation of dissolved oxygen, nitrite and salinity, alkalinity

Practical 5 : Identification of six fishes (2 marine, 2 freshwater, 2 Estuarine) following Taxonomic methods & procedures (mesistic & morphometric characters as mentioned by Day/Smith) + Gut content fishes

Practical 6 . Qualitative analysis of marine planktonic organisms to identify the most Common Mero and Holo planktonic organisms.

Practicals 7-8 : Identification of the most common benthos, and Nekton in aquatic environment (marine and fresh water) + study of taxonomic importance of radulae in gastropods

Practicals 9-11 : Population study of Local birds/insects, ciliates in the culture medium to explain growth curves (logistic & exponential)

Practical 12 : Collection and analysis of soil organisms Qualitative, quantitative and Depiction with histogram and pie diagram

Practical 13 : Study of the environmental conditions of the termites colony (Project Work)

Practical 14 : Study of Preferences, a) Preening behaviour in birds, b) Photo-chemo and Geotaxes in *Drosophila*

Practical 15 : a) Stimuli eliciting aggressive displays in male Siamese fighter, b) colour change in female Siamese fighter fish (The students will undertake a study cum collection tour to study, collect, identify and preserve marine and terrestrial animals)

Sessional Assessment

1	Practicals	}	30 marks
2	Report of Project		
3	Report on study Tour		10
4	Record		10
	Total	:	50

VI SEMESTER B.Sc.Ed

6.11 # Z-6 ZOOLOGY THEORY – 'Animal Physiology Biochemistry and Evolution;

Contact Hrs per Week. 3

Exam Duration: 3 Hrs

Max Marks : 100

Sessional : 20

Terminal : 80

OBJECTIVES To enable the students to comprehend the modern concepts on Physiology and to comprehend chemical nature & biological Molecules

COURSE CONTENT:

COMPARATIVE ANIMAL PHYSIOLOGY

UNIT 1 :

a) Nutrition Role of vitamins and mineral salts with reference to man, Enzymes – classification and properties (brief) Absorption of fats, proteins and carbohydrates in man, b) Circulation of Body fluids Blood Physico-chemical properties of erythrocytes, leucocytes and platelets.

Coagulation and Blood transfusion, Blood circulation Mechanism and control of circulation, Heart beat and blood pressure, Lymphatic system Lymph and its circulation

UNIT 2 :

a) Respiration Control and regulation of respiration, Haemoglobin and its properties, Oxygen transport, Oxygen dissociation curve in Man and Respiratory pigments in invertebrates Carbon Dioxide transport in Man, A review of Glycolysis and Krebs cycle, b) Homeostasis, Nitrogen excretion, nitrogenous excretory products and patterns of nitrogen excretion in animals, Ornith cycle, Influence of water deprivation Physiology of Nephron in Mammals Osmoregulation Mechanism of osmoregulation in Crustaceans, Insects, Pisces and Reptiles

UNIT 3 :

a) Nervous Coordination - Physio-chemical aspect of Nerve Impulse An account of functions of Autonomous nervous system (Man), b) Endocrine Coordination, Neurosecretion and Neuroendocrine integration Histology and physiology of following endocrine glands (hypo and hyper activities) i) Thyroid (ii) Parathyroid (iii) Adrenals (iv) Pituitary Metamorphosis of Frog and its endocrine control mechanism Insect hormones and their functions c) Reproductive Physiology and Physiology of gonads Histology (Hormones & Hormonal control), Estrous cycle in Rat – Menstrual cycle in Human, Human Population control.

EVOLUTION

UNIT 4 :

a) Origin of Life – Theories of origin of life, b) Theories of Evolution, Lamarckism and Darwinism (Review) Neo-Lamarckism and Neo-Darwinism De Vries theory of mutation and its significance in evolution The process of speciation, c) Adaptations Experimental approach towards the study of adaptations (examples from simple and complex types in animal), Adaptive radiations, Hardy-Weinberg's Law, Mimicry, warning colour (review), Genetic drift

UNIT 5 :

a) Geological time and its significance in evolution The emergence and disappearance of some invertebrates and vertebrates (Trilobites, Fishes

and Reptiles), b) Fossils - Fossils and fossilization, Living Fossils – Latemaria and Sphenodon Paleontological history of Horse, Elephant and Man, c) Zoogeography, with emphasis to oriental region and fauna, d) Principles and practice of Animal taxonomy

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment

References:

- 1 Adaptation by B Wallace and A M Srb (Prentice Hall Of India, New Delhi)
- 2 The origin of life by K John (Reinhold Publishing Corpn)
- 3 The evolution of Man by G W Lasker (Holt, Rinehart & Winston)
- 4 Organic Evolution by R S Lull (MacMillan)
- 5 Introduction to Evolution by P A Moody (Harper & Row, New York)
- 6 Evolution of Life by E C Olson (New American Library, New York)
- 7 Evolution by J M Savage (Holt, Rinehart and Winston)
- 8 Meaning of Evolution of G G Simpson (Oxford & India Book House Publishing Co, New Delhi, 1969)
- 9 Process of Organic Evolution by G L Stebbins (prentice hall of India, New Delhi, 1970)
- 10 Animal Behaviour by V G Dethier & B Stellar (Prentice Hall Of India, New Delhi)
- 11 Genetics and Evolution by RL Kochhar (S Nagin & Co, New Delhi 1970)
- 12 Evolution in Action by J Huxley (New American Library, New S Nagin & Co, New Delhi 1970)
- 13 The Origin of Species by D I Charles (Collier Book, New York, 1966)
- 14 Evolution and Pollution by A D Bradshaw (Edward Arnold, 1981)

VI SEMESTER B.Sc.Ed

6.11 # Z-6P · ZOOLOGY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES : To analysis biochemically the foodstuffs and urine, To develop the skills of hematology, To study the physiology of muscles, nerve and reproduction, To understand the behaviour in animals

COURSE CONTENT :

Practicals 1 & 2 :

a) Detection of Carbohydrates, Fats and Protein in food substances, b) Detection of various kinds of sugars (Maltose, Lactose, Sucrose, Fructose, Galactose)

Practicals 3 & 4 :

Detection of free Amino acids/sugars present in tissue extracts of animals, Using "paper Chromatographic Techniques"

Practicals 5 & 6

a) Preparation of Blood smears and staining, b) R B C counting

Practical 7 : W B C counting

Practical 8 :

a) Differential count of W B C in Mammals, b) Estimation of Haemoglobin

Practicals 9 & 10 :

Qualitative analysis of normal and abnormal constituents of urine

Practical 11 :

Study of heart beat and the effect of drugs and chemicals on heart beat in Frog/Rat (Demonstrations)

Practical 12 Study of muscle twitch in Frog (Demonstration)

Practical 13 : Detection of various digestive enzymes of Insects/Frog/Rat

Practicals 14 & 15 :

a) Study of histology of Endocrine glands from slides and Dissection of Endocrine Glands in Rat b) Study of vaginal smears of Rat

Sessional Assessment

1	Periodic assessments	30 marks
2	Report on the studies in animals physiology Project	10
3	Record	10
	Total	50

VII SEMESTER B.Sc.Ed.

7.13 # Z-7 : ZOOLOGY THEORY- 'Genetics Cell Biology, & Molecular Biology'

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks : 100

Sessional : 20

Terminal : 80

OBJECTIVES: To enable students to comprehend the modern concepts and applied aspects of cell biology and genetics, to create in them the awareness regarding common hereditary diseases

COURSE CONTENT:

UNIT 1 :

Mendel's Laws (Review-Solving of problems in Genetics based on mono and dihybrid crosses Tests/Experiments/cross), Interaction of genes, Codominance-inheritance of combs in poultry, supplementary, complimentary and Epistatic genes, Multiple factor inheritance with reference to skin colour in man and Kernel colour in wheat Multiple alleles Inheritance of coat colour in Rabbit and eye colour in Drosophila, Blood groups (ABO and Rh) in Man

UNIT 2 :

- a) Sex determination Sex chromosomes and sex determining mechanisms (XX,XO, XX,XY, ZZ, ZW types); Multiple sex chromosomes, genic balance theory - Gynandromorphs, Turner's, Klinefelter and Down's syndromes-, Sex determining genes, Barr body and its significance
- b) Linkage and crossing over Linkage and crossing over in Maize and Drosophila, cytological evidences for crossing over, linkage maps, Sex linked inheritance Eye colour in Drosophila, colour blindness and haemophilia in Man
- c) Genes and their actions, Gene mutation and its significance, Detection of mutation by CIB and Muller's methods, Role of genes in development Genes and diseases (Sickle Cell anaemia, Phenylketoneuria, Alkaptonuria, Galactosemia) Lethal genes
- d) Eugenics, Euphemics and Genetic Engineering Eugenics Prenatal diagnosis, Aminocentesis, Genetic screening, Euphemics Euphemics and its future, Genetic engineering Recombination DNA technology, somatic cell fusion

UNIT 3.

- a) Cell and Cell Divisions, Modern view of Mitosis, details of various stages of Meiosis, Theory of chiasma formation
- b) Chromosome Organization Chromosome models, Histones and their functions, Salivary gland and Lampbrush chromosomes and their ultrastructure, chromosome Puffing
- c) DNA and its replication Protein synthesis, Basic review of nucleic acids, Mechanism of Replication, Basic concept of genetic code and its significance, Protein synthesis, Transcription and Translation

UNIT 4:

- a) Ultrastructure and Function of Cell Organelles, Golgi bodies, Electron microscopic Structure of Golgi body and its biochemistry, Functions of Golgi complex, Role of Secretion
Mitochondria, Ultra structure of Mitochondrial membranes and their functions, Mitochondria particles and Respiratory chain complex in cristae
Lysosomes Ultrastructure Enzymes and their functions in extra cellular and intra cellular digestion,
Ribosomes Structure and their role in protein synthesis Nucleus
Ultrastructure and its role in cell division
- b) Cell Membrane, Ultrastructure, cell membrane model-fluid Mosaic model, Functions of cell membrane in transport, diffusion and active transport

UNIT 5:

- a) Fertilization Gametes and their fusion, Cortical changes, types of fertilization
- b) Parthenogenesis Arrhenotoky and Thelotoky-obligatory and cyclical, Artificial Parthenogenesis
- c) Cytology of Cancer Characteristics of cancer cells, Hypothesis about cancer, somatic mutation, viral gene mechanism, Role of Carcinogens in the induction of cancer

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment

References:

- 1 Cell Biology by C B Powar(Text)-(Himalya Publishing House, Bombay)
- 2 Cell Biology by De Robertis et al (Text)- (W B Saunders, Philadelphia)
- 3 A Text book of Cytology by R C Dalela & S R Verma (Text)-(Jaiprashnath & Co , Meerut)
- 4 Cell Biology by J D Burke (Scientific Book Agency , Calcutta)
- 5 Cell Biology A molecular approach by R D Dyson(Allyn & Bacon, Boston)
- 6 Cell Biology by R M Dowben (Harper & Row, New York)
- 7 Cell function by L L Langley (Affiliated East West Press, New Delhi)
- 8 Cytology by C D Darlington
- 9 Principles of genetics by Sinnott, Dunn and Dobzhansky (Text)-(McGraw Hill)
- 10 Genetics by E Altenberg (Text)- (Holt, Rinehart & Winston, New York)
- 11 Concepts and implications by A C Pai and H M Robert (Prentice Hall)
- 12 Genetics by Stricksberger (MacMillan)
- 13 Principles of Genetics by Gardner (John Willey)
- 14 Principles of Genetics by Irwin H Herskowitz (Little Brown & Co , Boston)
- 15 Elementary Genetics by Sig Singleton (Van Nostrand)

VII SEMESTER B.Sc.Ed

7.13 # Z-7P : ZOOLOGY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES : To develop the cytological techniques and preparation of permanent slides, To collect, identify, preserve and study the natural habit and habitat of animals

COURSE CONTENT:

Practicals 1 & 2 Study of mitosis in onion root tip and preparation of permanent slides

Practical 3 : Study of meiosis in *Poecilocera picta*

Practical 4 : Study of meiosis in *Tryxalis*.

Practical 5 Observation of mitochondrion in the ovary of Earthworm and Scorpion

Practical 6 : Preparation of the slides of mammalian chromosomes (Rat or Rabbit) from Bone marrow

Practical 7 a) Collection of fruit flies , handling and maintenance of culture of *Drosophila*, b) Identification of sexes in *Drosophila* Study of life cycle in *Drosophila*

Practical 8 : a) Dissection of larva and mounting of salivary glands of *Drosophila*, b) Study of banding patterns in the salivary gland chromosomes of *Drosophila*

Practical 9 Study of barr body in human tissue

Practical 10 Sorting out and study of the mutants of *Drosophila* with reference to their various contrasting characters in comparison with Normal flies-Vestigial wings, Ebony, curled wing, Sepia, white eye, Vestigial and ebony

Project 1: Conducting of breeding experiments to verify the law of segregation, law of independent assortment and law of sex linked inheritance

Project 2: Analysis of various traits in samples of human population, PC test, Blood Group distribution pattern, rolling of tongue, ear lobe attachment and baldness

Sessional Assessment:

1	Periodic assessment	30 marks
2	Project Report	10
3	Record	10
	Total	50

VIII SEMESTER B Sc.Ed**8.8 # Z-8 : ZOOLOGY THEORY – ‘ Developmental Biology & Economic Zoology‘****Contact Hrs per Week: 3****Exam Duration: 3 Hrs****Max Marks : 100****Sessional : 20****Terminal 80**

OBJECTIVES: To enable students to comprehend the modern concepts and applies of developmental biology

COURSE CONTENT :**DEVELOPMENT BIOLOGY :****UNIT 1 :**

- a) Fertilization, Types of Gametes and Eggs (Review), Egg-sperm interaction, acrosome Reaction – Fusion of nuclei- , cortical reactions,
- b) Cleavage Types of cleavages (Amphioxus, Frog and Chick), Factors influencing cleavage, mechanism of cleavage- a review of different views
- c) Gastrulation types of cell movements (Epiboly, Involution, Invagination and Delamination), Fate maps of frog, Gastrulation process in Frog and chick, Mechanism of cell movement, cell motility, change in cell shape

UNIT 2:

- a) Morphogenesis · Morphogenetic movements of cells with reference to epithelial and mesenchymal cells , cell changes and selective affinities of cells , b) Induction Primary organizer concept of Spemann, chemical and natural agents of induction, induction process as a biphasic gradient phenomenon, c) Neurulation Process of Neurulation in Frog, Role of microtubules, and microfilaments in neurulation in Frog, the structure and microfilaments in neurulation in Frog, the structure of early tadpole, Metamorphosis (Review)

UNIT 3 :

- a) Early development of chick Primitive streak and its formation in chick, Homology of Dorsal lip of Blastopore of frog and primitive streak, Salient features of chick embryos of 24 hour, 36 hour, 48 hour and 72 hrs and major advances and differences at each stage, b) Organogenesis Organogenesis in Frog and Chick with reference to the

following systems i) Development and differentiation of alimentary canal and its derivatives (lungs, liver and Pancreas), ii) Development of heart, arteries and veins-embryonic and extra embryonic, iii) Development and differentiation of brain and iv) Origin, development and differentiation of kidney, Gonads and their ducts

UNIT 4 :

a) Extra embryonic membranes Stages in the development of amnion, chorion (serosa) yolk sac and allantois, b) Placenta . Classification, structure and types with examples, c) Regeneration Major types of regeneration in animals, (morphallaxis and epimorphosis), Factors influencing regeneration, d) Role of genes in development.

ECONOMIC ZOOLOGY :

UNIT 5 .

a) Aim and scope of Economic Zoology; b) Animal products of commercial importance, c) Basic principles and cultural practices of - i) Apiculture, ii) Sericulture, iii) Aquaculture, d) Insect pests (paddy and stored grains) common insecticides and biological Control of insect

Sessional Assessment: 2 Tests OR 1 Test and 1 Assignment

References:

- 1 Introduction to Embryology by B I Balinsky(W B Saunders, Philadelphia, 1976)
- 2 Foundations of Embryology by B M Paten and B M Carison.
- 3 Foundations of Animal Development by A F Hopper and N H Hart (Oxford University Press, New York, 1980)
- 4 Vertebrate Embryology by R S McEwen (Oxford & IBM Publishing CO , New Delhi)
- 5 A Hand Book of Sericulture by Lyonemura & M N Rama Rao
- 6 C S I R Wealth of India (Supplement) on Fish and Fisheries (CSIR, New Delhi)
- 7 Bee keeping by J E Eckert and F R Shaw
- 8 Developmental Biology by , J W Brookbank
- 9 Patterns and Principles of Animal Development by J W Saunders Jr
- 10 Fish and Fisheries of India by V G Jhingran (Hindustan Publishing Corpn, New Delhi)
- 11 Destructive and Useful Insects- Their Habits and Control, by Melcalf and Flinatt (Tata McGraw Hill, New Delhi)

VIII SEMESTER B.Sc.Ed

8.8 # Z-8P : ZOOLOGY PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES To develop in them the skills-of staining, mounting of embryos of Chick and Frog.

COURSE CONTENT:

Practicals 1 & 2:

- a) Incubation of Hen's eggs and preparation of stained permanent whole mounts of 24, 36, 48 Hrs Chick embryos
- b) Study of the early developmental stages of Chick embryos

Practicals 3 & 4

- a) Preparation of paraffin blocks of Chick embryos of 24, 48 and 72 hrs
- b) Preparation of permanent stained mounts of T S and sagittal sections of Chick embryos (24, 48 and 72 hrs)

Practicals 5 & 6

- a) Study of the early developmental stages of Frog cleavage, blastula, gastrula, neurula and their sections
- b) Preparation and study of the sections of the early stages of tadpoles (T S and frontal sagittal Sections)

Practicals 7 : Study of the structure of the placenta of mammals of different types from slides

Practical 8 : The project work on the effect of the hypophysectomy in Frog

Practical 9 : Study of the effect of iodine/thyroid hormone and prolactin on the Metamorphosis of Frog (Demonstration)

Practical 10 : Study of fish and fisheries products of commercial importance

- a) Marine molluscan- pearl oyster (pinctada), edible oyster (*Crossostrea*) and mussel (*Perna*)-
- b) Crustacean-Lobster, Prawn and Shrimp
- c) Important marine and fresh water fishes

Practicals 11,12 & 13 :

Sericultural practices including practical study in the laboratory and observations in the field stations

Practicals 14 & 15 : Study of Apicultural Practices

Sessional Assessment:

1 Permanent mounts of stained chick embryos (whole mount and sections)	}	20 marks
2 Experimental studies in Embryology (Frog)		
3 Reports on Experimental Projects		10
4 Reports on Economic Zoology		10
5 Record		10
Total		50

I SEMESTER B.Sc.Ed

110 # CS-1 . COMPUTER SCIENCE THEORY

COMPUTER ORGANIZATION AND PROFESSIONAL APPLICATIONS

Contact Hrs per Week: 3

Max Marks. 100

Exam Duration: 3 Hrs

Sessional . 20

Terminal : 80

OBJECTIVES: On completion of the instruction, the students will be able to develop knowledge about fundamental aspect of digital circuits ranging from binary system to shift registers and ripple counters, explain in detail the structure and components of computer hardware and software, describe addressing methods and program sequencing and Assembly language, develop understanding of the fundamental concepts of underlying the microprocessors and their types, describe the input-output organisation and devices explain the basic concepts regarding memories and their types, design digital circuits for various mathematical operations

COURSE CONTENT

UNIT 1:

History of Computers, Von-Neumann concept , Binary systems, Boolean Algebra and Logic Gates, Combination Logic – Adders, Subtractors , Code conversion, Combinational Logic with MSL and LSL – Flip-flops, triggering of Flip Flops

Arithmetic – Number Representations, Addition of positive Numbers, Design of Fast Adders, Signed Addition and Subtraction, Arithmetic and Branching conditions Multiplication of Positive Numbers, Signed- operand Multiplication, Fast Multiplication, Integer Division , Floating - Point Numbers and operations, Concluding Remarks problems

UNIT 2 :

Introduction to Basic Structure of Computer Hardware and Software Addressing methods and Machine progress sequencing – Basic concepts, Memory Locations, Addresses, Encoding of Information , main memory operations, Instructions and Instruction sequencing, Addressing Modes, Assembly Language, Basic Input-output operations, Stacks and Queues, Subroutines

UNIT 3:

The processing Unit – Some Fundamental concepts, Execution of a complete instruction, Hardware control, performance considerations, Microprogrammed control, concluding remarks problems Concepts of CISC RISC, and stack processors

UNIT 4:

The Memory – Some basic concepts, semi-conductor RAM Memories, Read –Only memories, Speed, Size and Cost, Cache Memories, Performance considerations, Virtual Memories, Memory Management Requirements

UNIT 5:

Input / output organisation , accessing I/O devices, Interrupts , Processor examples, DMA, I/O hardware, Standard I / O interfaces, I/O devices, on line storage

Books Recommended

- 1 V Carl Hamacher, Zvonko G Vranesic, Safwat G Zaky – Computer Organization-(Mc Graw Hill International Edition)(4th Edition)
- 2 M Morris Mano Digital Logic and Computer Design,(Prentice Hall of India Pvt Ltd), 1999

Sessional Assessment. Two tests OR One Test and One Assignment

References:

- 1 Structured Computer Organisation Tannenbaum A S ,(PHI)
- 2 Introduction to digital computer design(4th Edition) , Rajaraman V & Radhakrishna T (PHI)
- 3 Computers today Suresh K Basandra, Galgotia Publications, Pvt Ltd , Delhi, 1996

I SEMESTER B.Sc Ed.

1.10 # CS-1P : COMPUTER SCIENCE PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

Getting introduced to various components of a Computer system, Windows 98/2000

MS Office Suite

Fundamentals of Internet Browsing , e-mailing

Sessional Assessment:

1	Records	10 Marks
2	Practicals	40
	Total	: 50

II SEMESTER B.Sc.Ed

2.10 # CS-2· COMPUTER SCIENCE

PROBLEM SOLVING AND PROGRAMMING IN C

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks 100
Sessional 20
Terminal 80

OBJECTIVES On completion of the instruction, the students will be able to design algorithms for various types of problem solving, develop knowledge about the main features of C language, explain the concept of data structure and describe the various types of structures, write programmes in C language for solving realistic problem

COURSE CONTENT

UNIT 1:

Introduction to problem solving Problem-solving aspect, Top-Down design, Implementation of algorithms, Program Verification, Efficiency of algorithms, Analysis of algorithms A swift introduction to C - Getting started, variables and arithmetic expressions, the for statement, symbolic constants – call by value, character arrays, external variables and scope

UNIT 2:

Types, Operators and Expressions - Variable names, Data types and sizes, constants, declarations Arithmetic operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions

Input and Output:- Standard input and output, formatted output – printf, variable length, argument lists, formatted input-scanf, file access, error handling slider and exit, line input and output, miscellaneous functions

UNIT 3:

Conditional expressions, precedence and order of evaluation Control flow - Statements and Blocks, If-Else, Else-If, switch, loops while and for, loops-do-while, break and continue, go to and labels

UNIT 4:

Functions and program Structure Basics of functions, functions returning Non-integers, external variables, scope rules, header files, static variables, register variables, block structure, initialisation, recursion, the C pre-processor

UNIT 5:

Pointers and Arrays - Pointers and Addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer arrays, pointers to pointers, multi-dimensional arrays Initialisation of pointer arrays, pointers VS multi-dimensional arrays, command-line arguments, pointers to functions, complicated declarations Structures - Basics of structures, structures and functions, arrays of structures, pointers to structures, unions, bit-fields

Books Recommended

- 1 How to Solve it by Computer R G Dromey, PHI, New Delhi
- 2 The C Programming Language Gottfried, Schaum Series

Sessional Assessment: Two tests OR One Test and One Assignment

References:

- 1 C Programming Balagurusamy, E

II SEMESTER B.Sc.Ed.

2.10 # CS-2P CCMPUTER SCIENCE PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks 50
Sessional : 50
Terminal : Nil

Exercises to study various features of the C Language, Programming C, Writing of well structured modular programs

To do operations like - matrix operations, sorting and searching (without naming the methods), classification of geometric figures, file operations, pointers, use of sub programs

Sessional Assessment Same as in I Semester.

III SEMESTER B Sc Ed

3.10 # CS-3 : COMPUTER SCIENCE

DATA STRUCTURES, OOPS AND C++

Contact Hrs per Week. 3
Exam Duration: 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES On completion of the instruction, the students will be able to describe various language processing activities, explain the elements of assembly language programming and designing of assembler, explain macros and macro processors, describe compiler, interpreters and linkers, develop skills for use of software tools, explain the concepts of operating system and its evaluation, describe the characteristics of operating system ranging from batch processing to real time operating systems, develop the concepts of processing and scheduling, define deadlock and describe approaches of deadlock handling, describe process synchronization ranging from implementing control to inter-process messages in UNIX, describe memory management and organisation and IO programming, develop the skills of using file systems ranging from directory structure to protection of user files

COURSE CONTENT:

UNIT 1:

The Stacks-Definition, examples, operations like Infix, Post fix etc using Stacks, use of Stacks in subroutines

Queues- Linear and circular Queues and their applications

UNIT 2:

Dynamic memory allocation- Single and doubly linked lists, circularly linked lists and their applications

Non linear data structures Trees definitions, binary trees, elementary tree traversals(In order, pre and post)

UNIT 3:

Sorting Methods Bubble sort, exchange, selection, merge sort and heap sort

Searching Linear and binary search, free searching, hashing

UNIT 4

Basic Concept of OOP, Definitions, Over View of OOP using C++, Elements of C++ Language, Tokens and identifiers, variables and constants, Data types, Operators, Control Statements, Functions, passing arguments and returning values, Reference Variable and arguments, Inline functions, Default arguments, Returning by reference, Classes and Objects,

Declaration of classes and objects in C++, Objects on function arguments, Array of objects, Returning objects from function, structures and classes

Constructors and Destructors Constructors, Dynamic initialisation of objects, copy constructors, Dynamic constructors, Destructors, Constraints on Constructors and Destructors

Operator overloading Overloading unary operators, overloading binary operators, Data and Type conversions Derived Classes and Inheritance Derived classes and base class, Derived class constructors, over riding the member functions, class hierarchies, Inheritance, Multiple inheritance

UNIT 5.

Templates, Generic classes and functions, function templates, class templates Exception Handling Use of exception handling, Try block, catch handler, Throw statement, Exception specification Virtual Functions Virtual functions and polymorphism, Friend functions, Static functions, comparison of macros and in line functions, memory allocation and management, container classes and Iterator streams

Sessional Assessment: Two tests OR One Test and One Assignment

Books Recommended:

- 1 The C++ Programming Language B Stroustrup, Addison Wesley Longman 1999
- 2 C++ Primer (3rd Edition) S B Lipman, J Lajole, Addison Wesley 1998
- 3 Object Oriented Programming in Turbo C++ Robert Lafore, Galgotia
- 4 The Complete Reference JAVA 2 P Naughton and H Schildt, Tata McGraw Hill, 1999

III SEMESTER B.Sc.Ed.

3.10 # CS-3P : COMPUTER SCIENCE PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

Programming C++ Writing of well structured modular programs – case studies of use of various Data Structures Stack, Queue, List, Binary Tree using array and pointers and their applications in sorting, searching, string manipulation and list manipulations

Sessional Assessment: Same as in I Semester.

IV SEMESTER B.Sc. Ed

4.10 # CS-4 : COMPUTER SCIENCE THEORY

SYSTEM PROGRAMMING AND OPERATING SYSTEM

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES: On completion of the instruction, the students will be able to describe various language processing activities, explain the elements of assembly language programming and designing of assembler, explain macros and macro processors, describe compiler, interpreters and linkers, develop skills for use of software tools, explain the concepts of operating system and its evaluation, describe the characteristics of operating system ranging from batch processing to real time operating systems, develop the concepts of processing and scheduling, define deadlock and describe approaches of deadlock handling, describe process synchronization ranging from implementing control to inter-process messages in UNIX, describe memory management and organisation and IO programming, develop the skills of using file systems ranging from directory structure to protection of user files

COURSE CONTENT:

UNIT 1:

System programming

Language Processors Introduction, language processing activities, fundamentals of language processing, fundamentals of language specifications, language processor development tools Data structures for

language processing, search data structures, allocation data structures
Scanning and Parsing Scanning, parsing – assemblers Elements of
assembly language ,programming, a simple assembly scheme, pass structure
of assemblers, design of a two pass assembler, a single pass assembler for
IBM PC.

UNIT 2:

Macros and Macro Processors Macro definition and call, macro expansion,
nested macro calls, advanced macro facilities, design of a macro pre-
processor

Compilers and Interpreters: Aspects of compilers and interpreters compilation,
memory allocation, compilation of expressions, compilation of control
structures, code optimisation, interpreters

Linkers Relocation and linking concepts, design of a linker, self-relocating
programs A linker for MS DOS, linking for overlays, loaders Software Tools
Software tools for program development, editors, debug monitors,
programming environments, user interfaces

UNIT 3:

Evolution of OS Functions OS functions, evolution of OS functions, batch
processing systems, multiprogramming systems, time sharing systems, real
time operating systems, OS structure

Processes Process definition, process control, interacting processes,
implementation of interacting processes, threads

Scheduling Scheduling policies, job scheduling, process scheduling, process
management in Unix, scheduling in multiprocessor OS

UNIT 4:

Deadlocks definition, resource status modelling, handling deadlocks,
deadlock detection and resolution, deadlock avoidance, mixed approach to
deadlock handling

Process Synchronization Implementing control synchronization, critical
sections, classical process synchronization problems, evaluation of language
features for process synchronization, semaphores, critical regions, conditional
critical regions, monitors, concurrent programming Ada Inter-process
communication Inter-process messages, implementation issues, mailboxes,
inter-process messages in Unix, inter-process messages in Mac.

UNIT 5:

Memory Management Memory allocation preliminaries, contiguous memory
allocation, non-contiguous memory allocation, virtual memory using paging,
virtual memory using segmentation Organization and IO programming IO
organization, IO devices, physical IOCS, fundamental file organizations,
advanced IO programming, logical IOCS, file processing in Unix

File Systems Directory structures, file protection, allocation of disk space,
implementing file access, file sharing, file system reliability, the Unix file
systems Protection and Security Encryption of data, protection and security
mechanisms, protection of user files, capabilities.

Books Recommended

System Programming and Operating Systems (Second Revised Edition) D M Dhamdhare, Tata McGraw Hill Publishing Company Ltd , 1999

Sessional Assessment: Two tests OR One Test and One Assignment

References:

- 1 Modern Operating System: Andrees S Tanenbaum, Prentice Hall, 1995
2. Operating System Concept: Abraham Siberschatz and Galvin, Addison Wesley Publishing.
- 3 Operating System Madnik and Donovan, McGraw Hill

IV SEMESTER B.Sc.Ed.**4.10 # CS-4P : COMPUTER SCIENCE PRACTICALS**

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

1 Familiarity with file systems and commands of W-NT, UNIX / Linux

2 Programming with Visual Basic

(Note Theoretical aspects of VB can be introduced in the Lab sessions at the beginning of the semester)

Sessional Assessment: Same as in I Semester.

V SEMESTER B.Sc.Ed**5 12 # CS-5 : COMPUTER SCIENCE THEORY****FILE MANAGEMENT AND DATA BASE MANAGEMENT SYSTEM**

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES: On completion of the instruction, the students will be able to explain the concepts of data making and data base, describe the three levels of architecture of DBMS, explain different types of file organisation, describe the relational and hierarchical models of data base; explain the manipulation and design of data base, retrieve data from data base through different

quarries, develop skills to use the provisions for the data security and integrity, use the detailed RDBMS package (Fox-Pro / MS-Access)

COURSE CONTENT:

UNIT 1:

Basic Concepts Data modelling for a database, records and files, abstraction and data integration, the three-level architecture proposal for a DBMS, components of a DBMS, advantages and disadvantages of a DBMS, summary Data models Introduction, data associations, data models classification, entity – relationship model, a comparative example, relational data model, network data model, hierarchical model, a comparison, summary File organization introduction, serial files, sequential files, index-sequential files, direct file, secondary key retrieval, indexing using tree structures, logical and physical pointers record placement

UNIT 2:

The Relational Model Introduction, relational database, relational algebra, relational calculus, concluding remarks on data manipulation, physical implementation issues The Hierarchical Data Model The tree concepts, hierarchical data model, data definition, data manipulation, updates, implementation of the hierarchical database, additional features of the hierarchical DML

UNIT 3:

Relational Database Manipulation Introduction, Data manipulation, views, SQL, remarks, QUEL, data manipulation QUEL, embedded data manipulation language, A critique SQL, QUEL Relational database design Relation Scheme and Relational Design A consequence of Bad Design, Universal Relation, Functional Dependency, Relational Database Design, Database Design: The organization and its information system, Definition of the problem, Analysis of Existing system and procedures, Preliminary Design, Computing system decision, Final design, Implementation and testing, Operation and Turning

UNIT 4:

Query Processing Introduction, An example, general strategies for query processing, transformation into an equivalent expression, expected size of relations in the response, statistics in estimation, query, query improvement, query evaluation, evaluation of calcular expressions, view processing, a typical query processor, Recovery Reliability, transactions, recovery in a centralized DBMS, reflecting updates to the database and recovery, buffer management, virtual memory and recovery, other logging schemes, cost comparison, disaster recovery Concurrency Management Introduction, serializability, concurrency control, locking scheme, timestamp-based order, optimistic scheduling, multiversion techniques, deadlock and its resolution, atomicity concurrency and recovery Database security, integrity and control. Introduction, security and integrity threats, defence mechanisms, integrity, statistical data bases, auditing and control

UNIT 5:

RDBMS Packages Details of a database package (like Fox Pro or MS Access), database design and program maintenance (insert, update, delete) and for enquiries as well for batch – processing **Data organisation:** Files and Fields, Data access, indexing, Use of procedures and passing parameters to procedures user friendliness and menu-drives program development, providing for error conditions **Data Input** Custom built screens, data validation, templates and functions of data input, screen format files **Data output** Formatted output on screen and printer, advantages of Custom designed output, use of multiple files simultaneously, report generation using multiple files, ANSI, SQL, commands, data security and privileges, introductory concepts on ORACLE / RDBMS

Books Recommended

An Introduction to Database Systems Bipin C Desai, Galgotia Publications Pvt Ltd , 1998

Sessional Assessment: Two tests OR One Test and One Assignment

References:

- 1 Principles of Database Systems Ullman, Feffery D Galgotia Publication Pvt Ltd , 1982
- 2 An Introduction to Database Systems Volumes I and II Date, C J , Addison Wesley, 1981, 1983
3. Database Concepts Knuth, Silbersatz and Sudershan

V SEMESTER B.Sc.Ed.

5.12 # CS-6P : COMPUTER SCIENCE PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

Familiarity with MS ACCESS/Oracle, FOX PRO File creation, Manipulations, Sorting, Indexing, Report Writing, Creation of Simple data base applications with use of SQL Queries, Use of Forms and Reports

Sessional Assessment: Same as in I Semester

VI SEMESTER B.Sc.Ed.

6.12 # CS-6 : COMPUTER SCIENCE THEORY

RECENT TRENDS IN COMPUTING

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES: On completion to the instruction, the students will be able to describe different types of computer graphics, explain different types of graphic display systems, describe the attributes of output primitives, explain the transformations and viewing of two-dimensional graphics, describe the basic concepts of three-dimensional graphics, explain the method of visible-surface detection, illumination models and surface rendering, design computer animation and explain its functions, describe the various aspects of multimedia and multimedia authoring system

COURSE CONTENT:

UNIT 1:

Graphics and Multimedia

A Survey of Computer Graphics Computer-Aided Design, Presentation Graphics, Computer Art, Entertainment, Education and Training, visualization, Image Processing, Graphical User Interfaces.

Overview of Graphics Systems Video Display Devices, Raster-Scan Systems, Random-Scan Systems, Graphics Monitors and Work stations, Input Devices, Hard-copy Devices, Graphics Software

Output Primitives Line-Drawing Algorithms, Circle-Generating Algorithms, Ellipse-Generating Algorithms, Pixel Addressing, filled-Area Primitives Attributes of Output Primitives Line Attributes, Curve Attributes, Color and Gray scale Levels, Area Fill Attributes, Character Attributes, Bundled Attributes, Inquiry Functions, Antialiasing, Graphical User Interfaces and Interactive input methods

Two Dimensional Geometric Transformations Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations, Other Transformations, Transformations Between Coordinate Systems, Transformation Functions, Raster Methods for Transformations.

Two Dimensional Viewing The viewing pipeline, Viewing Coordinate Reference Frame, Window-to-viewpoint Coordinate Transformation, Two Dimensional Viewing Functions, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping, Text Clipping Structures and Hierarchical Modelling Structure Concepts, Editing Structures, Basic Modelling concepts, Hierarchical Modelling

UNIT 2:

Computer Animation: Design of Animation Sequence, General Computer-Animation Functions, Raster Animations, Computer-Animation, Languages, Key Frame Systems, Motion Specification

Multimedia Introduction to multimedia, Hardware, Networking, Software-applications, Environment, CD-ROM WORM Optical Drives, Flat Panel Displays, Non-Temporal CCD Cameras, Scanners, Frame Grabbers, Formats Audio Digital Audio, Wave Files, Music, MIDI, Graphics Animation Tweaking, Morphing, simulating Acceleration, Motion Specification, Video Analog Video, Operations, Digital Video, Multimedia Authoring Systems

UNIT 3:

Image processing Introduction, Gray Level Scaling Transformations, Equalization, Geometric Image Scaling and Interpolation, Smoothing Transformations, Edge Detection, Laplacian and Sharpening Operators, Line Detection and Template Matching, Logarithmic Gray Level Scaling, The Statistical Significance of Image Features

UNIT 4:

Intelligent Systems (Pattern Recognition)

Introduction, Scene Segmentation and Labelling, Counting Objects, Perimeter Measurement, Following and Representing Boundaries, Projections, Hough Transforms, Least Squares and Eigenvector Line Fitting, Shapes of Regions, Morphological Operations, Texture, Fourier Transforms, Color, System Design, The Classification of White Blood Cells, Image Sequences, Cardiac Blood-Pool Image Sequence Analysis, Computer Vision, Image Compression

UNIT 5:

Intelligent Algorithms (AI and Expert systems)

Books Recommended:

- 1 Pattern Recognition and Image Processing Earl Gose, Richard, J, and Steve Jost, Prentice Hall of India Pvt Ltd , 2000
- 2 Computer Graphics (HRN) D Hearn and P M Baker, Prentice Hall of India, 1995
(2nd Edition)
- 3 Multimedia Systems design (AND) Prabhat K Andleigh and Kiran Thakrar, Prentice Hall of India, 1996

Sessional Assessment: Two tests OR One Test and One Assignment

References:

Fundamentals of Interactive Computer Graphics (FOL) J D Foley and A Van Dan, Addison-Wesley (2nd Edition)

VI SEMESTER B.Sc.Ed.

6.12 # CS-6P : COMPUTER SCIENCE PRACTICALS

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

Matlab implementation of the features

Sessional Assessment: Same as in I Semester.

VII SEMESTER B.Sc.Ed.

7.11 # CS-7 : COMPUTER SCIENCE THEORY

DATA COMMUNICATION, COMPUTER NETWORK AND INTERNET TECHNOLOGY

Contact Hrs per Week: 3
Exam Duration: 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES. On completion of the instruction, the students will be able to explain one concept of data communication and networking, describe network protocols and the processes of encoding and decoding of signals, explain the concept of transmission of digital data, describe transmission media, multiplexing error detection and correction, describe various aspects of data link control and data link protocols, explain the concept of Local Area Network, describe various methods of switching, describe the hardware used for networking, describe the protocols used for computer networking hardware, explain the concept of architecture and protocol of Internet working, develop awareness about data exchange through internet, use internet to access data and exchange e-mail,

COURSE CONTENT:

UNIT 1:

Introduction, Data communication, Networks, Protocols and Standards, Standard organizations
Basic Concepts. Line configuration, Topology, Transmission Mode, Categories of Networks, Internet works
The OSI Model The Model, functions of the layers

Signals Analog and Digital, Aperiodic and Periodic Signals, Analog Signals, Digital Signals, Mathematical Approach(optional)
Encoding Digital-To-Digital Encoding, analog-To-Digital Encoding, Digital-to-Analog Encoding, Analog-to-Analog Encoding

UNIT 2:

Transmission of Digital Data. Interfaces and Modes, Digital Data Transmission, DTE-DCE Interface, Other Interface Standards, Modems
Transmission Media: Guided Media, Unguided Media, Performance
Multiplexing Many to one/one to many, Types of Multiplexing, Multiplexing Application, The Telephone System
Error Detection and Correction Types of Errors, Detection, Error Correction

UNIT 3:

Data Link Control Line Discipline, Flow Control, Error Control
Data Link Protocols Asynchronous protocols, Synchronous protocols, Character-oriented Protocols, Bit-oriented Protocols
Local Area Networks Project, Ethernet, Token Bus, Token Ring, FDDI, Comparison
Switching, A Network layer Function, Circuit Switching, packet Switching, Message Switching, Network Layer.

UNIT 4:

X 25 X 25 Layers, Packet Layer Protocol
Networking and Internetworking Devices Repeaters, Bridges, Routers, Gateways,
Routing Algorithms
Transport Layer Duties of the Transport Layer, Connection The OSI Transport Practical
Upper OSI Layers. Session Layer, Presentation Layer, Application Layer

UNIT 5:

Internet working, Concept, Architecture, and Protocols
IP Internet Protocols Addresses
TCP Reliable Transport Services
Client-Server Interaction The Socket Interface Example of a client and a server
Naming with the Domain Name Systems
Electronic Mail Representation and Transfer
File Transfer and Remote File Access
World Wide Web Pages and Browsing
CGI Technology for Dynamic Web Documents

Books Recommended:

- 1 Introduction to Data Communications and Networking Behrouz Forouzan, Catherine Coonsbs and Sophia Chung Fegan, Gtagta McGraw-Hill Publishing Limited.
- 2 Computer Networks and Internets(Second Edition) . Douglas E. Commer, Prentice Hall

Sessional Assessment: Two tests OR One Test and One Assignment

References:

- 1 Computer Networks Andrew S Tanenbaum, Prentice Hall of India
- 2 Data and Computer Communication William Stalling, PHI

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7.11 # CS-7P : COMPUTER SCIENCE PRACTICALS

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

a Compilation of Internship Records using Computers

b Exercises on Internet and Net Working

Sessional Assessment: Same as in I Semester.

VIII SEMESTER B.Sc.Ed

8.9 # CS-8 · COMPUTER SCIENCE THEORY

ANALYSIS OF ALGORITHMS AND ADVANCED ALGORITHMS

Contact Hrs per Week: 3

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES : On completion of the instruction, the student will be able to appreciate the algorithm concepts, analyse algorithms, solve problems using algorithms, use graph theory for practical applications

COURSE CONTENT :

UNIT 1:

Algorithm concepts, properties, on designing Algorithms, Space complexity, time complexity, the worst case, the best case, upper bound, lower bound
Comparing the performance of several algorithms that solve a problem.
The complexity expression for sorting, searching and matrix operations

UNIT 2:

Graph theoretic Algorithm.

Data structure- Incidence matrix, adjacency matrix, cut set, circuit matrix, modification in case of diagraphs, spanning tree.

MSt-Kruskal's , Prim's algorithms

Single source shortest paths, shortest paths from a source to destination

Completing analysis of the algorithms

UNIT 3:

OR based algorithms Knapsack problem, Job sequencing, shortest path by dynamic programming, linear programming, Transportation and Assignment problems

UNIT 4:

Numerical Algorithms Devising and analysing the algorithm to solve $f(x) = 0$ (Newton, Secant, Regula Falsi , Bisection, Obtaining all real roots)

Algorithms to solve simultaneous equations (Gauss Elimination , LU , Iteration algorithm)

Interpolation, differential equations and their analysis

UNIT 5:

Algorithm for - calculation of mean, SD, correlation coefficient

Algorithms for- curve fitting, Linear regression

Books Recommended:

- 1 Analysis and Design of Algorithms -Horowitz and Rajashekar
- 2 Numerical Methods for Engineers – Chopra and Canale
- 3 Graph Theory – Narasingh Deo

Sessional Assessment: Two tests OR One Test and One Assignment

VIII SEMESTER B.Sc.Ed.**8 9 # CS-8P : COMPUTER SCIENCE PRACTICALS**

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

Problem Solving using various numerical techniques

Sessional Assessment: Same as in I Semester.

I SEMESTER B.Sc.Ed.

1.11 # ICT-1 : INFORMATION AND COMMUNICATION TECHNOLOGY(ICT)

Contact Hrs per Week: 2
Exam Duration: Nil

Max Marks : 25
Sessional : 25
Terminal : Nil

OBJECTIVES: On completion of the instruction, the students will be able to describe a computer system, describe the working of a computer, open the windows operating system, use word processing package, appreciate the use of the word, processing package in education, acquire the skill of trouble shooting whenever there are problems in the working of a computer

COURSE CONTENT:

UNIT 1 : COMPUTER FUNDAMENTALS

Basic anatomy of computers, Introduction to computing, What is computer, Characteristics of computers - Speed, Storage, Accuracy, Versatile, Automation, Diligence, Classification of computers - Generation of computers Types of computers, Data representation within computer -Bits, Bytes, EBCDIC, BCD, ASCII, number system, Basic structure of computer-Input, Process, Output, Memory – RAM, ROM, EPROM, DRAM, CACHE, CDROM

UNIT 2 : INPUT/OUTPUT DEVICES

Input Devices - Key boards, Mouse, Touch Screen, MICR, Light Pen, Joy Stick, Digitizer, Scanner, Output Devices – VDU, Printers (Impact, Non Impact), Impact - Dot matrix, Line Printer, Daisy Wheel, Drum printer, plotter, Non impact - Laser, Inkjet, Thermal, Data storage devices - Magnetic Tape, Magnetic Disk, Floppy Disk, Hard Disk, Data Cartridge, Compact Disk, Optical Disk

UNIT 3 : INTRODUCTION TO COMPUTER LANGUAGES

Machine language, Assembly language, High Level Language, 4 GL, Translator – Compiler, Interpreter, Assembler

UNIT 4 : OPERATING SYSTEMS

Operating Systems Concepts (MSDOS, UNIX), What is operating system?, Batch Processing, Multiprogramming, Time sharing, Real time, Computer networks, Distributed processing, Installation of a software, MS-Windows-Introduction to Windows, Advantages of Windows, Control Panel, File Manager, Accessories-Write, Paint brush, Calendar, Calculator, Card file, MS Office, Overview

UNIT 5 : MS-WORD

Starting MS-Word; Creating a Document ; Opening a Document, Saving a Document; Editing Text, Formatting Text, Viewing Documents, Formatting Documents - Line spacing, Paragraph spacing, Setting Tabs, Indenting Text, Aligning Text, Adding Headers and Footers, Numbering Pages, Inserting a Table, Proofing a Document - Spell-check Utility, Automatic Spell-check, Auto Text, Auto Correct, Printing a Document, Mail Merge, Simple trouble shooting, Use of MS-WORD in Education

Sessional Assessment:

1	Test	15 marks
2	Records	10
	Total	: 25

References

1. Fundamentals of Computers, Rajaraman V, PHI
2. MS-Office User Manual
3. Intel Teach to the Future - Beginner's Curriculum

II SEMESTER B.Sc.Ed

2.11 ICT-2: INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

Contact Hrs per Week: 2
Exam Duration: Nil

Max Marks : 25
Sessional : 25
Terminal : Nil

OBJECTIVES : On completion of the instruction, the students will be able to load a spreadsheet package, analyse a spreadsheet software; use different commands of the spreadsheet, use the internet for browsing, use e-mail for sending and receiving messages

COURSE CONTENT:

UNIT 1 : CONCEPT OF A SPREAD SHEET – MS EXCEL

Introduction to MS-Excel, Starting MS-Excel ; Opening a Worksheet; Saving a Worksheet , Spreadsheet Operations - Entering Numbers, Text, Dates & Time, Formulas, Editing the Worksheet - Deleting Cells, Rows, Columns, Inserting Cells, Rows, Columns

UNIT 2 : WHAT-IF ANALYSIS

Printing a Worksheet; Formulas and Functions - Entering Formulas, Absolute and Relative Reference of a Cell, Mixed Referencing, Operators in Formulas, Using Text, Date and Time in a Formula, Arrays and Named Ranges

UNIT 3 : FUNCTIONS

Entering Functions, Calculation using Function, Different types of Functions in Excel.

UNIT 4 : CHARTS, MACROS AND FORMS

Creating a Chart, Editing a Chart; Inserting and Deleting in a Chart, Save and Print a Chart

UNIT 5 : MACROS

Creating and Running Simple Macros, Creating and Running Menu Macros, Concept of Internet, e-mail

Sessional Assessment: Same as in I Semester.

References

- 1 MS-Office User Manual
- 2 Fundamentals of Computers, R P Singh, BPB Publication
- 3 Intel Teach to the Future – Beginner's Curriculum

III SEMESTER B.Sc.Ed.

3.11 # ICT-3 : INFORMATION AND COMMUNICATION TECHNOLOGY(ICT)

Contact Hrs per Week: 2
Exam Duration: Nil

Max Marks : 25
Sessional : 25
Terminal : Nil

OBJECTIVES : On completion of the instruction, the students will be able to load PowerPoint software on the computer, use the PowerPoint for creating a presentation, appreciate the use of PowerPoint in instruction, develop support material for instruction using PowerPoint

COURSE CONTENT:

UNIT 1 : MS-POWER POINT

Starting Power Point, The Power Point Menu , Opening an Existing Presentation, Creating a New Presentation, Saving and Closing a Presentation, Exiting Power Point

UNIT 2 : USING MASTERS: SLIDE, TITLE, HANDOUT, NOTES

Editing Text, Viewing a Presentation in different view; Adding and Deleting Slide, Selecting Text, Inserting, and Deleting Text, Moving and Copying Text, Changing Text Case, Spell Checking

UNIT 3: FORMATTING TEXT

Changing Text Attribute, Styles, Changing Bullet Characteristics, Aligning, Line Setting, Paragraph Setting, Changing slide Colour Scheme

UNIT 4 : DRAWING OBJECTS LIKE LINES, ARCS, RECTANGLES, ELLIPSES

Drawing Freeform Shapes, Using Auto Shape features in Power Point, Rotating Objects, Modifying Colours and Lines, Adding Headers and Footers

Unit 5 :

Preparation of student support material (Computer Aided Instruction)

Sessional Assessment: Same as in I Semester.

Reference.

- 1 MS-Office User Manual
- 2 Intel Teach to the Future – Beginner's Curriculum

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7.14 # ICT-4: INFORMATION AND COMMUNICATION TECHNOLOGY(ICT)

Contact Hrs per Week: 3

Exam Duration: Nil

Max Marks : 50

Sessional : 50

Terminal : Nil

OBJECTIVES : On completion of the instruction, the students will be able to use computer technology to prepare reports on the internship records, analyse data collected at the internship center.

Project I Compilation of various Internship Records using Computers

Sessional Assessment:

1.	Test	·	20 marks
2.	Project Work		20
3	Assignment	·	10
	Total	:	50

VIII SEMESTER B.Sc.Ed.**8.10 #ICT-5 : INFORMATION AND COMMUNICATION
TECHNOLOGY(ICT)**

Contact Hrs per Week: 3
Exam Duration: Nil

Max Marks : 50
Sessional : 50
Terminal : Nil

OBJECTIVES : On completion of the instruction, the students will be able to analyse educational software packages, discriminate between good and average/poor software packages, appreciate the use of ICT in society, prepare enrichment materials for teaching , monitor the computer systems against possible virus attack

Project II : Evaluation of Educational Software Social Issues of Information and Communication Technology (ICT), Preparation of slides/ teaching material in content areas

Sessional Assessment:

1	Test	20 marks
2	Preparation of Teaching Material	20
3	Assignment	10
	Total	: 50

V SEMESTER B.Sc.Ed.

5.3 # TOM-1 : TEACHING OF MATHEMATICS

Contact Hrs per Week: 4
Exam Duration : 3 Hrs

Max Marks: 150
Sessional : 50
Terminal : 100

OBJECTIVES: On completion of the course the students will have

- Understanding of the characteristics of Mathematical language and its role in Science
- Understanding of the nature of axiomatic method and mathematical proof
- Knowledge about aims and general objectives of teaching secondary school mathematics
- Ability to state specific objectives in behavioural terms with reference to concepts and generalizations
- Ability to teach different kinds of mathematical knowledge consistent with the logic of the subject
- Ability to evaluate learning of concepts and generalization
- Ability to identify difficulties in learning concepts and generalization and provide suitable remedial instruction

(All transactions to be made based on the appropriate contents listed in Unit 5)

COURSE CONTENT:

UNIT 1. NATURE AND SCOPE OF MATHEMATICS

Meaning and dimensions of mathematics, the nature of mathematical propositions, truth values, compound propositions, truth tables, open sentences, truth sets, Venn diagram, logically valid conclusions, use of quantifiers Implications - one way and two way - necessary and sufficient conditions, A mathematical theorem and its variants - converse, inverse and contra positive, undefined terms in mathematics, quasi definitions and definitions in mathematics, the defining properties of a definition, Difference between proof and verification, Difference between pure and applied mathematics, History of mathematics with special emphasis on Indian mathematics

UNIT 2 : AIMS AND OBJECTIVES OF TEACHING SECONDARY SCHOOL MATHEMATICS

Need for establishing general objectives for teaching mathematics, Study of the aims and general objectives of teaching mathematics vis-à-vis the objectives of secondary education Writing specific objectives of different content categories in mathematics

UNIT 3 : STRATEGIES OF TEACHING MATHEMATICAL CONCEPTS

Nature of concepts, concept formation and concept assimilation, Moves in teaching a concept - defining, stating necessary and/or sufficient condition, giving examples accompanied by a reason Comparing and contrasting, giving counter examples, non examples, Use of Concept Attainment and Advance Organizer Models, planning and implementation of strategies in teaching a concept.

UNIT 4 : TEACHING OF GENERALISATION

By exposition Teaching by exposition, Moves in teaching a generalization, introduction, Introduction moves - focus move, objective move, motivation move - Assertion move, application move, interpretation moves, justification moves - planning of expository strategies of teaching generalizations

By guided discovery Nature and purpose of learning by discovery, Inductive, deductive - guided discovery strategies, Maxims for planning and conducting discovery strategies, planning of strategies involving either induction or deduction or both

UNIT 5: EVALUATION OF LEARNING CONCEPTS AND GENERALIZATIONS

Stating measurable objectives of teaching concepts and generalizations, construction of appropriate test items, Diagnosing basic causes for difficulties in learning concepts and generalizations, planning remedial instruction based on the diagnosis

Pedagogical Analysis of Secondary School Mathematics

In order to explain the different pedagogical aspects of teaching mathematics, the following topics in mathematics, which are presently taught at secondary school level, are included (As and when there are changes in topics to be taught in Mathematics at school level, the corresponding changes in topics should be made)

Arithmetic

Development of number system, Modular Arithmetic, Ratio and proportion, time and work

Algebra

Sets, Relations, Functions and Graphs, Systems of linear equations and their graphical solutions, quadratic equations, Linear inequations and graphical solutions and their applications, Theory of Indices and logarithms, Cyclic factorization, Factor theorem and Remainder Theorem, Matrices, Axioms of Groups and Fields with examples from Number Systems

Geometry

Axioms of Euclidian Geometry, Polygons and Circles, Congruency and similarity of triangles, Polyhedrons and Prisms, Introduction to transformation geometry of two dimensions (straight lines only), Construction of geometrical figures

Trigonometry

Trigonometric ratios, simple identities and elementary problems on heights and distances, solution of simple trigonometric equation

Statistics

Tabular and Graphical representation of Data, Measures of Central Tendency and Variability

Computing

Computer devices flow charts and algorithms

Sessional Work:

- 1 Analysis of a unit/chapter in a mathematics textbook to identify the concepts, principles and processes and to understand the underlying mathematical structures
- 2 Stating specific objectives for a mathematics lesson
- 3 Identification and evaluation of moves and teaching skills used in a lesson/lesson plan
- 4 Planning and implementation of appropriate strategies for teaching mathematical concepts and generalizations in simulated and real classroom situations
- 5 Construction of appropriate test items to measure different outcomes of learning concepts and generalization
- 6 Identification of students' learning difficulties and their remediation

Sessional Assessment:

1	Tests (2 Tests or 1 Test and 1 Assignment)	20 marks
2	Content Analysis	05
3	Writing instructional objectives	05
4	Planning Learning Experiences	05
5	Simulated Teaching	15
	Total	: 50

References:

- 1 Butler and Wren (1965) , The Teaching of Secondary Mathematics, London McGraw Hill Book Company
- 2 Cooney, T J and Others (1975), Dynamics of Teaching Secondary School Mathematics, Boston' Houghton Mifflin
- 3 Kapfer, Miriam B (1972). Behavioural objectives in Curriculum Development Selected Readings and Bibliography Englewood Cliffs, NJ: Educational Technology.
4. Mager, Robert (1962) Preparing instructional objectives, Palo Alto, C A Fearon
5. NCERT, A textbook of Content-cum-Methodology of Teaching Mathematics, New Delhi NCERT
- 6 Polya, George (1957) How to solve it, Garden City, New York Doubleday

- 7 Servas, w and T Varga Teaching School Mathematics - UNESCO Source Book
- 8 State text books in Mathematics of Southern Region from Class VI to X

Periodicals

Journal of Research in Mathematics
 Mathematics Teaching
 School Science and Mathematics
 The Mathematics Teacher

VI SEMESTER B.Sc.Ed.

6.3 # TOM-2 : TEACHING OF MATHEMATICS

Contact Hrs per Week: 4
 Exam Duration : 3 Hrs

Max Marks: 150
 Sessional : 50
 Terminal : 100

OBJECTIVES: On completion of the course the student will have

- Understanding of mathematical proof in the context of secondary school mathematics
- Understanding of nature, importance and strategies of problem-solving
- Ability to teach proof of theorem and solution of problem to develop relevant skills
- Ability to evaluate understanding of proof of a theorem and problem-solving skills

COURSE CONTENT:

UNIT 1 : TEACHING OF UNDERSTANDING

Proof: Developing an intuition about the nature of proof - to make the transition from concrete thinking to more formal reasoning and abstract thinking as they progress from class to class, kinds of proof - proof by mathematical induction, proof by contradiction, proof by cases, the contrapositive, conjectures, disproof by counter example

UNIT 2 : TEACHING PROBLEM SOLVING

Definition of a problem, problem solving and teaching problem solving, importance of teaching problem solving posing a problem, discovering or exploring various options for solving the problem i.e developing heuristics, carrying out the plan and generating and extending a good problem

UNIT 3 : EVALUATION OF LEARNING PROOFS AND PROBLEM SOLVING

Stating measurable objectives of teaching proof and problem-solving, Construction of test items Long answer type (essay type, short answer type), objective type - multiple choice, matching, true/false - to measure the learning outcomes Diagnosis and remediation of difficulties in learning problem solving and proof

Construction of unit tests Design and Blue print, item construction, marking scheme, questionwise analysis. Constructing mathematics question paper General instruction with nature of options, overall coverage, marking scheme

UNIT 4 : PLANNING FOR INSTRUCTION IN MATHEMATICS

Selecting the content for instruction, identifying teaching points for a mathematics lesson, organization of content

Stating instructional objectives for a mathematics lesson and identifying learning outcomes in behavioural terms

Designing – learning experiences, appropriate strategies, teaching aids, evaluation tools, etc

Writing lesson plans for mathematics lessons

Planning a unit of instruction in mathematics

Designing teaching aids in mathematics, psychological basis, Rationale and limitations.

UNIT 5 : INSTRUCTIONAL MATERIAL IN MATHEMATICS

Meaning, Types and purposes of instructional materials in Mathematics, Plan for preparation and utilization of instructional materials Preparation of instructional materials

Pedagogical Analysis of Secondary School Mathematics

In order to explain the different pedagogical aspects of teaching mathematics, the following topics in mathematics which are presently taught at secondary school level are included (As and when there are changes in topics to be taught in Mathematics at school level, the corresponding changes in topics should be made)

Arithmetic:

Development of number system, Modular Arithmetic, Ratio and proportion, time and work

Algebra:

Sets, Relations, Functions and Graphs, Systems of linear equations and their graphical solutions, quadratic equations, Linear inequations and graphical solutions and their applications, Theory of Indices and logarithms, Cyclic factorization, Factor theorem and Remainder Theorem, Matrices, Axioms of Groups and Fields with examples from Number Systems.

Geometry :

Axioms of Euclidian Geometry, Polygons and Circles, Congruency and similarity of triangles, Polyhedrons and Prisms, Introduction to transformation

geometry of two dimensions (straight lines only), Construction of geometrical figures

Trigonometry:

Trigonometric ratios, simple identities and elementary problems on heights and distances, solution of simple trigonometric equation

Statistics:

Tabular and Graphical representation of Data, Measures of Central Tendency and Variability

Computing:

Computer devices, flow charts and algorithms.

Sessional Work:

Observation and analysis of strategies followed in teaching proof and problem-solving

Preparation of atleast one lesson plan in each of teaching proof, and problem solving and practice of the strategies in simulated situation/real classroom situations

Construction of unit test in mathematics

Construction of a diagnostic test and an achievement test

Planning and Implementation of remedial instructional strategies

Sessional Assessment:

1	Tests (2 Tests or 1 Test and 1 Assignment)	10 marks
2	Unit Plan	05
3	Lesson Plans	10
4	Unit Tests	10
5	Preparation of Teaching Aids	05
7	Simulated Teaching	10
	Total	: 50

References:

- 1 Butler and Wren (1965) , The Teaching of Secondary Mathematics, London McGraw Hill Book Company
- 2 Cooney, T J and Others (1975) , Dynamics of Teaching Secondary School Mathematics, Boston : Houghton Mifflin
- 3 Iglewicz, Boris and Stoye, Judith (1973) An Introduction to Mathematical Reasoning, New York The MacMillan Co
- 4 Kapfer, Miriam B (1972). Behavioural objectives in Curriculum Development Selected Readings and Bibliography Englewood Cliffs, NJ Educational Technology
- 5 Mager, Robert (1962) Preparing instructional objectives, Palo Alto, C A Fearon
- 6 NCERT, A textbook of Content-cum-Methodology of Teaching Mathematics, New Delhi : NCERT

- 7 Polya, George (1957) How to solve it, Garden City, New York Doubleday
- 8 Servas, W and T Varga Teaching School Mathematics - UNESCO Source Book
- 9 State text books in Mathematics of Southern Region from Class VI to X

VII SEMESTER B.Sc.Ed.

7.4 # TOM-3: TEACHING OF MATHEMATICS

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks: 150

Sessional : 50

Terminal : 100

OBJECTIVES: On completion of the course student teachers will

- Understand the characteristics and strategies for teaching exceptional children in mathematics
- Prepare and evaluate instructional materials in mathematics
- Appreciate the need for continuing education of mathematics teachers
- Make critical appraisal of internship experiences

COURSE CONTENT :

UNIT 1 : TEACHING OF GIFTED/CREATIVE CHILDREN IN MATHEMATICS

Identifying characteristics of students of high ability, Provision in heterogeneous class for students of high ability, Enrichment programmes - assisting learning, supplementary text material, summer programmes, correspondence course, mathematics clubs, contests and fairs

UNIT 2 : TEACHING OF SLOW LEARNERS IN MATHEMATICS

Identifying slow learners in mathematics, Suggestions for teaching mathematics to slow learners, helping slow learners in heterogeneous class, supplementary material, recreational activities, laboratory activities, cooperative learning and special lessons

UNIT 3 : CURRICULAR REFORMS IN MATHEMATICS

Rationale, objectives, principles, designs and materials produced in some recent curricular reforms at the National and State levels and their critical appraisal

Evaluation of Instructional Materials in Mathematics

- a) Terms of reference for evaluation.
- b) Laying down criteria for evaluation
- c) Evaluation of a Textbook used in internship

UNIT 4 : MATHEMATICS LABORATORY : DESIGN AND MANAGEMENT

Nature, meaning, types, functions of and suggestions for the development of a mathematics laboratory. Activities in Mathematics Laboratory
Physical Requirement Equipment, Furniture and other materials
Maintenance of Laboratory and records

UNIT 5 : PROFESSIONAL DEVELOPMENT OF MATHEMATICS TEACHERS

Need for recurrent education, types of inservice programme for mathematics teachers, role of mathematics teachers' association, journals and other resource materials in mathematics education, professional growth – participation in conferences/seminars/workshops
(Critical appraisal of internship experiences will be an integral component of all the units)

Sessional Work :

Review of articles related to particular theme/aspect of teaching exceptional children in mathematics from journals in mathematics education

Development of an instructional aid on a topic in mathematics and method of using it

Case study of gifted / talented / slow learner in the class

An appraisal of inservice programme for mathematics teachers organized by some nodal institution in the area/region

Sessional Assessment:

1	Tests (2 Tests or 1 Test and 1 Assignment)	20 marks
2	Resource unit	10
3	Textbook Evaluation	10
4	Review of Research Articles related to Mathematics	10
Total		: 50

References:

Same as in 1 6 and 2 6

V SEMESTER B.Sc.Ed.

5.4 # TOP-1: TEACHING OF PHYSICAL SCIENCE

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks: 150

Sessional : 50

Terminal : 100

OBJECTIVES: On completion of the course, students will be able to :

- Understand the nature and structure of physical science
- Understand the aims and general objectives of teaching physical science in secondary schools
- Analyse the content of physical science into concepts, facts, rules and principles
- Understand the method of ,science
- State meaningful specific objectives in behavioural terms with reference to specific concepts
- Plan suitable learning experiences for the stated objectives
- Achieve mastery over methods, techniques and skills
- To acquire skill in constructing objective based test items

COURSE CONTENT:

UNIT 1 : NATURE AND STRUCTURE OF PHYSICAL SCIENCE

Nature What is Science?, Physical Science?-, Successive steps through which science develops (observational, classificational or experimental) The philosophy of science, science is mechanistic, describing cause and effect relationship, discouraging theological explanations concerned with what and how questions, not in conflict with religion, research methods of reporting scientific information

Structure Product of Science, Content categories, concepts, facts, principles, laws, generalizations, theories – their characteristics and organizations – implications for teaching Physical Science

UNIT 2 : AIMS AND OBJECTIVES OF TEACHING PHYSICAL SCIENCE AT SECONDARY LEVEL

Aims and objectives of teaching physical science in secondary schools, objectives of science teaching as enumerated in National Curriculum Framework Translation of general objectives into specific objectives in behavioural terms with reference to specific concepts, Identification of competencies, skills to be developed in students through teaching physical science

UNIT 3 : STRATEGIES FOR TEACHING PHYSICAL SCIENCE

Salient features of investigatory method, lecture-cum-discussion, lecture-demonstration, group investigation/discussion and cooperative learning with suitable illustrations

Selection of strategies according to objectives; Factors involved in choosing appropriate strategies (motivation, mental schemata, activity and learning percepts)

UNIT 4 : EVALUATION OF LEARNING IN PHYSICAL SCIENCE

Illustration of examples of objective based test items – essay, short-answer type, very short answer type, matching, multiple choice, completion, alternate response

Preparation of objective type and objective based test items in physical science, evaluation of practical and project work in physical science

UNIT 5 : PEDAGOGICAL ANALYSIS OF CONTENT IN PHYSICAL SCIENCE AT SECONDARY LEVEL

Pedagogical analysis of content may be dealt by choosing selected units from the list given below

Mechanics

Displacement, velocity, acceleration, equations of motion, Force and motion, balanced and unbalanced forces, Newton's laws of motion, momentum, frictional force, projectile motion, Rocket equation

Gravitation

Universal Law of Gravitation, acceleration due to gravity 'g' as intensity of the gravitational field, variation of 'g', escape velocity, weightlessness in space, Kepler's laws of motion and its applications

Heat

Heat as molecular motion, concept of heat and temperature, specific heat, latent heat, change of state and thermal expansion

Oscillations and Waves

Simple harmonic motion, concept of a generalized monochromatic wave in one dimension, relationship of wave motion with simple harmonic motion, light and sound waves as transverse and longitudinal waves, interference of sound waves, phenomenon of beats, resonance

Development of a model for gases

Boyle's law, Charles's law, Graham's law of diffusion of gases, Avagadro's law – kinetic theory of gases

Dalton's atomic theory

Laws of chemical combination – Atomic weight, molecular weight and mole concept

Developing models of the atom

Electrical nature of matter, discharge of electricity through gases – electron, proton and neutron Faraday's laws of electrolysis, α -ray scattering experiment – Rutherford's model, line, spectra, Bohr's model of the atom Basis for the present day ideas of atomic structure

Electronic configuration

Electronic configuration of atoms, atomic properties and periodic classification of elements

Chemical Bonding

Why and how atoms combine – covalent bond, electrovalent bond – shapes and polarities of molecules

SESSIONAL WORK :

Analysis of content of a given unit and arrangement of teaching points in a logical order

Writing of instructional objectives in relation to the content of the assigned unit Planning suitable learning experiences for each of the objectives listed below

- 1 To draw the x-t graph using tape timer
- 2 Verification of Newton's II Law – cart experiment
- 3 Law of conservation of momentum – verification using dynamic carts
- 4 Investigating the laws of simple pendulum
- 5 Oscillations of a liquid column
- 6 Determination of the specific heat of a solid
- 7 Experiments to show thermal expansion in solids, liquids and gases
- 8 Experiments on relative density and upthrust
- 9 Preparation and study of the properties of gases – H_2 , O_2 , Cl_2 , NH_3 , HCl and CO_2
- 10 Preparation of saturated solutions and determination of the solubility of substances in grams per litre Crystal growing from saturated solution Preparation of crystals of ferrous sulphate and copper sulphate from reactions in solution
- 11 To find out the relationship between current, time and mass of metal deposited during electrolysis
- 12 Study of the discharge of electricity through gases – cathode rays, anode rays, study of the line spectra of some gases
- 13 To study the relationship between pressure, volume and temperature of a gas

Sessional Assessment :

1.	Tests (one test and one assignment)	20 marks
2.	Content Analysis	05
3.	Writing Instructional Objectives	05
4.	Planning learning experiences	05
5.	Simulated Teaching	15
	Total	: 50

References:

- 1 Teaching Science by Inquiry in the Secondary School by R B Sund L W Trawbridge (Charles and Merrill, Ohio)
- 2 The Art of the Science Teacher (STEP) Editors C R Sultan & J T Harysom (McGraw Hill)
- 3 The Nature of Scientific thought by M Walker (Prentice Hall)
- 4 Methods of Teaching Science – Bhatt B D and Sharma S R (Kanishka Publishing House, Delhi)
- 5 Modern Science Teaching – Heiss, E D, Obourn E S and Hoffman C W (MacMillan)
- 6 Modern Science Teaching – Sharma R C (Dhanapat Rai and Sons, New Delhi).
- 7 New UNESCO Source Book of Science Teaching (UNESCO, Paris)
- 8 Science Teaching in Schools – Das R C (Sterling Publishers, New Delhi)
- 9 UNESCO Handbook for Science Teachers (UNESCO, Paris)
- 10 teaching High School Science, A Book of Methods – Brabndwein P F and Watson B W (Harcourt, Brace and Worth, New York)
- 11 Teaching of Science – Yadav R S (Anmol Publications, New Delhi)
- 12 Teaching of Science in Secondary Schools (NCERT, New Delhi)
- 13 Innovative Science Teaching for Physical Science – Radha Mohan (Prentice Hall, New Delhi)
- 14 Methods for Teaching - A skills approach Jacobson, David et al (Charles E Merill Publishing Company, Columbia)
- 15 Chemistry an Experimental Science – (Indian Edition, NCERT)

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6.4 # TOP-2 : TEACHING OF PHYSICAL SCIENCE

Contact Hrs per Week: 4
Exam Duration : 3 Hrs

Max Marks: 150
Sessional : 50
Terminal : 100

OBJECTIVES: On completion of the course, the student will be able to .

- Achieves mastery over methods, techniques and skills
- Acquires mastery over development and use of tools of evaluation.
- Develop unit plan and innovative lesson plans for concept achievement and acquisition of subject specific skills.
- Develop teaching aids and other learning materials
- Handle A V Aids

COURSE CONTENT:

UNIT 1 : STRATEGIES FOR TEACHING PHYSICAL SCIENCE

Problem solving method and steps involved, illustrations for problem solving method

Models of teaching Concept Attainment Model and Ausubel's Advance Organiser Model, Inquiry Model and Inductive Thinking Model

UNIT 2 : EVALUATION OF LEARNING IN PHYSICAL SCIENCE

Weightages to content and objectives, preparation of a blue-print of an achievement test/unit test in physical science. Diagnostic Testing – steps involved in the diagnosis of learning difficulties and formulation of remediation in physical science

UNIT 3 : INSTRUCTIONAL MATERIALS FOR LEARNING PHYSICAL SCIENCE

Use of audio-visual aids Radio, TV, Overhead projector and video Use of computer for teaching physical science.

Fabrication of Improvised/Low Cost apparatus and drawing of charts

UNIT 4 : PLANNING FOR TEACHING PHYSICAL SCIENCE

Unit Planning and its importance in the teaching-learning process, format for developing unit plan, resource unit plan

Lesson Planning – need for planning a lesson, stages in a lesson plan, purpose they serve, lesson plan format, format for evaluation of a lesson plan and criteria for evaluation of a lesson

Observation and recording of observations, format for observation of a lesson

UNIT 5 : PEDAGOGICAL ANALYSIS OF CONTENT IN PHYSICAL SCIENCE

Pedagogical analysis of content may be dealt by choosing selected units from the list given below

Light

Reflection and refraction of light, image formation in lenses and mirrors, optical instruments, dispersion of light, rainbow formation (primary and secondary), nature of light, electromagnetic spectrum

Electrostatics and Current Electricity

Electric charge, electric cells, electric field, Coulomb's law, electric potential, concept of electric current, Ohm's law, resistances in series and parallel effects of electric current, magnetic effects and Oersted's experiment, electromagnetic induction

Radioactivity and Nuclear Energy

Natural radioactivity, α - β - particles and γ rays, half-life, artificial radioactivity, radioactive isotopes, carbon dating, constituents of the nucleus, binding energy, packing fraction and mass defect, nuclear dimensions, nuclear density, nuclear forces, cathode rays

Semiconductors

Semiconductors silicon and Germanium as semiconductors, n-type and p-type semiconductors, pn junction, diode and its operation, npn transistor and its function.

Earth and Universe

Structure of the earth, Earth as an engine, earth as a member of the solar system, stars, alpha centauri as the nearest star to solar system, galaxies (milky way), constellations – Orion, Ursa major and Ursa minor, pole star, earth and evolution of a star, black hole, theory of the expanding universe, red shift and Doppler Effect in light, Astronomical units – light year and parsec.

Energy effects in chemical reactions

Exothermic and endothermic reaction – heats of reactions.

Equilibrium in chemical reactions

Recognizing equilibrium, dynamic nature of equilibrium, state of equilibrium, factors affecting equilibrium, Equilibrium constant – Le Chatelier's principle, Application of Le Chatelier's principle, Solution equilibria, Concepts of acids and bases

Rates of chemical reactions

Factors affecting reaction rates – Energy of activation – Catalysis

Electrochemical Cells

Chemistry of electrochemical cells – activity series – oxidation –reduction reactions – oxidizing and reducing agents – oxidation number

Metallurgical operations

Metallurgy of copper, aluminium and iron

Chemistry of carbon compounds

Shapes of simple organic molecules – hydrocarbons – petroleum Chemistry of some simple polymers

Sessional Work

Writing unit plan and resource unit

Preparation of lesson plan

Construction of test items and preparation of blue print

Writing unit test

1 Verification of the relation $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

2 Use of the ray apparatus to demonstrate simple concepts in optics.

3 Experiments using the ripple tank.

4 Verification of Ohm's law

5 Series and parallel combination of resistances

6 Mapping of the magnetic field due to a solenoid.

7. Simulation of Half-life in radioactivity using a burette.
- 8 Pn-junction characteristics
- 9 Exothermic and endothermic reactions – determination of heats of reactions – combustion and neutralisation
- 10 Chemical equilibrium – applications of Le Chateliers principle
11. Study of reaction rates
- 12 Study of oxidation – reduction reactions.
- 13 Construction of galvanic cells
- 14 Preparation of laboratory reagents and standard solutions

Sessional Assessment :

1	Tests(one test and one assignment)	10 marks
2	Unit plan	05
3	Lesson Plan	10
4	Unit Test	10
5.	Preparation of Teaching Aids	05
6	Simulated Teaching	10
	Total	: 50

References:

- 1 As in Teaching of Physical Sciences of V Semester
- 2 Preparing Objective Examinations – A Handbook for Teachers, Students and Examiners – Harper Jr , Edwin A and Erika S Harper, (Prentice Hall, New Delhi)
3. More effective Science Instruction in Secondary Education, Anderson, Hans O and Koutnil, Paul G Towards - (MacMillan Co , New York and Courier Mac Millan, London)
- 4 National Curriculum for Elementary and Secondary Education – A framework – (NCERT Revised Edition)
- 5 Teaching of School Physics – Pengicon Book (UNESCO)
- 6 Teaching School Chemistry – Waddington and Sterling, (UNESCO, Paris)

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7.6 # TOP.3 : TEACHING OF PHYSICAL SCIENCE

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks: 150

Sessional : 50

Terminal : 100

OBJECTIVES: On completion of the course, the student will be able to

- Organise exhibitions, field trips and science clubs.
- Analyse learning difficulties and to develop instructional materials for slow learners, children with learning difficulties and to prepare enrichment material for gifted learners.

- Critically analyse curricula and textbooks in physical science at the secondary level
- Design and organize a physical science laboratory
- Prepare instructional sheets for laboratory exercises
- Make critical appraisal of the internship experiences.
- Understand the purpose and usefulness of inservice training and other resources for professional growth
- Analyse and explore alternative solutions to some science related social concerns

COURSE CONTENT:

UNIT 1 : CO-CURRICULAR ACTIVITIES

Need for science clubs, investigatory projects, field trips, science fairs and science exhibitions, science magazines

Science Related Social Concerns. Identification, analysis and exploration of the possible solutions of some of the science based social issues (Nuclear power, thermal power and hydroelectric power, alternate sources of energy, sustainable development, environmental crisis, drug abuse, AIDS)

UNIT 2 : TEACHING OF SLOW LEARNERS AND GIFTED CHILDREN IN PHYSICAL SCIENCE

Characteristics and identification of gifted and slow learners, methods and programmes to meet their needs – enrichment programme through individualized, supervised instruction, supplementary learning materials, remedial teaching for slow learners, activities to nurture creativity and tasks for gifted learners

UNIT 3 : CURRICULAR REFORMS IN PHYSICAL SCIENCE

Analysis of the present secondary school curriculum in physical science (CBSE, State) with respect to (1) principles of curriculum construction, (2) national goals, (3) nature and structure of the subject and (4) resources and personnel available to transact the same in classroom

Selected Physical Science Curricula in India and Abroad Study of principles, design and materials produced in recent curricula PSSC Physics, CBA, CHEM Study, Nuffield (O-level) Physics and Chemistry and their adaptability to Indian conditions

Textbook analysis Features of a good textbook, instructional materials in physical science, criteria for evaluation of instructional materials

UNIT 4 : SCIENCE LABORATORY : DESIGN & MANAGEMENT

Laboratory Design . Physical requirements, furniture and their dimensions, equipment, maintenance of various registers and disposal of broken items
Organisation of laboratory work, preparation of instruction sheets and reports, safety measures

UNIT 5 : PROFESSIONAL DEVELOPMENT OF PHYSICAL SCIENCE TEACHERS

Professional growth of a science teacher Preservice and Inservice Education and Training, professional literature for Physical Science teachers, reference books, journals and reports, Computer aided instruction

(Critical appraisal of the internship experiences will be an integral component of all the units)

Sessional Work :

- Development of self instructional materials
- Critical analysis of CBSE, States and NTS examination papers
- Evaluation of textbooks in Physical Science
- Review of articles in Science Education relevant to secondary education
- Prepare a workbook resource unit in Physical Science

Sessional Assessment :

1	Tests(One Test and one assignment)	20 marks
2	Resource Unit	10
3	Textbook Evaluation	10
4	Review of Research Article related to Science	10
	Total	: 50

References: Same as in TOP 1 of V Semester and TOP 2 of VI Semester

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5.5 # TOB-1 : TEACHING OF BIOLOGICAL SCIENCE

Contact Hrs per Week: 4
Exam Duration : 3 Hrs

Max Marks: 150
Sessional : 50
Terminal : 100

OBJECTIVES: On completion of the course, the student-teacher will be able to:

- Understand the importance of biological science as a subject and its relationship with other subjects
- Understand aims and objectives of teaching Biological Sciences in secondary schools
- Acquire competence in preparing lesson plans
- Achieve mastery over the methods, techniques and skills for transacting the contents of Biological Sciences

- Identify subject areas in Biology for activity based learning
- Analyse the content of Biological Science and to identify concepts, facts, rules, principles
- Acquire applied values of Biological Science

COURSE CONTENT :

THEORY :

UNIT 1 : NATURE AND SCOPE OF BIOLOGICAL SCIENCE

The characteristics of Modern Biology, What is Biology? How is it different from Physical Science? Correlation of Biology with other school subjects with reference to physical sciences, mathematics, social studies and languages Importance of studying Biology for self and society, Contributions of Indian Biologists of International repute.

UNIT 2 : AIMS AND OBJECTIVES OF TEACHING SCIENCE

National goals and priorities in relation to school Biology at secondary level General and specific objectives – use of behavioural terms with reference to cognitive, affective and psychomotor domain Identification and development of competencies/skills/abilities in secondary school students

UNIT 3 : STRATEGIES FOR TEACHING BIOLOGY

Teaching of concepts in biology Definition, concept formation and concept assimilation, types of concepts, concept analysis, strategies for development of concepts and concept assimilation Group investigation/co-operative learning, inquiry training, demonstration, observation, problem-solving strategies, learning through projects – discovery approach, enhancing creativity and self-learning abilities, multi-media, programmed instruction Method/Approach in Teaching Biological Science

UNIT 4 : EVALUATION OF LEARNING IN BIOLOGICAL SCIENCE

Objective based evaluation and its importance Writing test items/evaluatory items with respect to the concepts to be developed Construction of following types of evaluatory items

- | | |
|---------------------|---------------|
| a) Multiple Choice, | b) Completion |
| c) True or False, | d) Matching |
| e) Short Answers, | f) Essay type |

UNIT 5 : PEDAGOGICAL ANALYSIS IN BIOLOGICAL SCIENCE

- Analysis of lessons from Biology textbooks of VIII, IX and X Std to identify, facts, concepts, principles Providing relevant learning experiences leading to development of lesson plans
- Writing general and specific objectives in behavioural terms based on specific concepts.
- Planning and writing learning experiences

The following content areas are selected for analysis, writing lesson plans.
Taxonomy of plants and animals

Life processes – Respiration, Nutrition, Circulation, Excretion, Reproduction, Control and Co-ordination, Transpiration, Photosynthesis
 Heredity – Mendel's laws, Biological molecules – enzymes, DNA, RNA, Cell – Structure functions, Mitosis, Meiosis
 Anatomy – Tissues, Organs, Organ Systems, Evolution, Health and Hygiene
 Man and Environment – Ecosystems, Food Chain
 Pollution, Protection of Environment, Biogeochemical cycles

Sessional Work :

- 1 Identification of facts, concepts, principles from secondary level textbooks.
- 2 Writing general and specific instructional objectives in behavioural terms based on specific concepts
- 3 Planning and writing learning experiences on specific concepts
- 4 Preparation of lesson plan
- 5 Microscopy-temporary and permanent slide preparation using pond water, plant materials, animal materials
- 6 Experiments related to respiration and transpiration
- 7 Experiments related to photosynthesis
- 8 Experiments related to osmosis
- 9 Blood smear and blood groups
- 10 Protozoan and microbial cultures
- 11 Study of Cell Division – mitosis
- 12 Study of Cell Division – meiosis

Sessional Assessment :

1	2 Tests or 1 Test and 1 Assignment	20 marks
2	Content Analysis	05
3	Stating instructional objectives	05
4	Simulated teaching	15
5	Learning experiences	05
	Total	50

References:

- 1 Decceco, J P and Crawford, W (1977) The Psychology of Learning and Instruction, New Delhi Prentice Hall of India
- 2 Klausmeir, H J (1964) Learning and Human Abilities, Educational Psychology, Tokyo Harper & Row & John Weather Hill
- 3 Lingre, H C (1976) Educational Psychology in the classroom, New York John Wiley and Sons
- 4 New UNESCO Source Book for Teaching Science; Unesco, Paris, Richardson, J S Science Teaching in Secondary Schools, New York Prentice Hall
- 5 Saunders, N H (1962) The Teaching of General Science in Tropical Secondary Schools, London Oxford University Press
- 6 Smith, M D (1975) Learning and its Classification, Boston Allyn and Bacon, Inc.

- 7 Sood, J K (1989) New Directions in Science Teaching, Chandigarh Kohli Publishers
- 8 Edwin, A, Harper Jr A and Erika S Harper (1992) Preparing objective Examination, A handbook of Teachers, Students and Examination, Prentice Hall of India Pvt Ltd , New Delhi

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6.5 # TOB.2 : TEACHING OF BIOLOGICAL SCIENCE

Contact Hrs per Week: 4
Exam Duration : 3 Hrs

Max Marks: 150
Sessional : 50
Terminal : 100

OBJECTIVES: On completion of the course, the student-teacher will be able to:

- To acquire competence in preparing lesson plans, unit plans and designing resource units
- Achieve mastery over the methods, techniques and skills for transacting content of Biological Science
- Acquire skills to design suitable laboratory activities – preparation and conduction
- Acquire skills to write test items, prepare unit test, blue print for evaluation.
- Prepare teaching aids, select relevant references, understand importance of audio-visual materials

COURSE CONTENT :

UNIT 1 : STRATEGIES IN TEACHING BIOLOGICAL SCIENCE

- a) Identification and development of competencies/skills/abilities in secondary school students
- b) Teaching of concepts in biology Definition, concept formation and concept assimilation, types of concepts, concept analysis, strategies for development of concepts and concept assimilation Concept attainment, Advanced organizer, Inductive theory, inquiry model Group investigation/co-operative learning, inquiry training, demonstration, observation, problem-solving strategies, learning through projects – discovery approach, enhancing creativity and self-learning abilities, multi-media, programmed instruction/Method/Approach in Teaching Biological Science

UNIT 2 . EVALUATION OF BIOLOGICAL SCIENCE

- Unit Test – Blueprint and its importance
- Evaluation of practical work in Biology
- Critical analysis of question paper → (State/CBSE), preparation of test items for question bank, importance of question bank

- Diagnosis of hard spots, learning difficulties of students and suggestions for remedial teaching

UNIT 3 : INSTRUCTIONAL MATERIALS FOR LEARNING OF BIOLOGY

Preparation and use of teaching aids, audio visual materials – charts, models, aquaria, terraria, school garden, museum, herbarium, television, computers improvised learning aids, supplementary books, handbooks, laboratory guides, teaching kits etc

UNIT 4 : PLANNING OF INSTRUCTION IN BIOLOGICAL SCIENCE

- 1 Teaching unit (lesson planning)
- 2 Unit Plan
- 3 Resource Unit
- 4 Plan for laboratory exercises

UNIT 5 : PEDAGOGICAL ANALYSIS

Complete analysis of units, from the textbooks of Biology of VIII, IX and X Std to identify concepts, facts, principles Identification of hardspots, designing suitable strategies

The following content areas are selected for analysis, writing lesson plans

Taxonomy of plants and animals

Life processes – Respiration, Nutrition, Circulation, Excretion, Reproduction, Control and Co-ordination, Transpiration, Photosynthesis

Heredity – Mendel's laws, Biological molecules – enzymes, DNA, RNA, Cell – Structure functions, Mitosis, Meiosis

Anatomy – Tissues, Organs, Organ Systems, Evolution, Health and Hygiene

Man and Environment – Ecosystems, Food Chain

Pollution, Protection of Environment, Biogeochemical cycles

Sessional Assessment :

1	2 Tests or 1 Test and 1 Assignment	10 marks
2	Unit Plan	05
3	Lesson Plan	10
4	Unit Test	10
5	Preparation of Teaching Aids	05
6	Simulated Teaching	10
	Total	: 50

References:

- 1 Das, R C (1985) Science Teaching in Schools, Sterling Publication
Innovations in Teacher Education Science Teacher Education Project (STEP) McGraw Hills, New York
- 2 Heiss, E D, Obourn E S and Hoffmann C W (1961) Modern Science Teaching by MacMillan publications, New York
- 3 Mangal S K Teaching of Physical and Life Sciences, Arya Book Dep , New Delhi

- 4 Mason M and Ruth T Peters Teacher Guide for Life Sciences, published by D Van Nostrand Company, Inc , New York
- 5 NCERT (1988) National Curriculum for Elementary and Secondary Education A Framework (Revised Ed)
- 6 NCERT (1955) Environmental Education in the School Curriculum, New Delhi
- 7 NCERT (1996) science for Classes IX and X, New Delhi
- 8 Karnataka Govt (1998) Science Textbooks – Classes VIII, IX and X
- 9 NCERT Environmental Education Process for pre-service Teacher Training Curriculum Development, UNESCO-UNDP International Series 26 prepared by NCERT, New Delhi
- 10 NCERT Procedures for Developing an Environmental Education Curriculum, UNESCO-UNDP International Environmental Education Programme, Environmental Education Series 22, New Delhi
- 11 Nair, P K G (1985) Principle of Environmental Biology, UNESCO training of science teachers and educators, Bangkok, UNESCO
- 12 Sood J K Teaching Life Sciences, published by Kohli Publication
- 13 Sharma, R C Modern Science Teaching, Dhanpat Rai and Sons, Delhi
- 14 Sytnik, K M Living in the Environment – A source book for Environmental Education, UNESCO

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7.5 # TOB.3 : TEACHING OF BIOLOGICAL SCIENCE

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks: 150

Sessional : 50

Terminal : 100

OBJECTIVES: On completion of the course, the student-teacher will be able to

- Prepare students to actively participate in various co-curricular activities
- Develop leadership qualities, cooperative working, dignity for labour while organizing group activities
- Equip with the strategies to take care of needs of talented students and design suitable remedial measures
- To analyse the secondary school Biology textbooks, resource materials
- Acquire various skills involved in laboratory exercises, maintenance of laboratories, museum, performing demonstrations.
- To acquaint with the skills required for a biology teacher, modes of improvement in professional skills
- Make critical appraisal of Internship experiences

COURSE CONTENT:

UNIT 1: CO-CURRICULAR ACTIVITIES IN BIOLOGICAL SCIENCE

Nature Club, Eco clubs, Biology Clubs, Bird Watching, exhibitions, Science fairs (organizing and management), student's magazines, albums
Excursions to nearby places Involvement of community resources in teaching Biology Science related social concerns

UNIT 2 : TEACHING TALENTED AND SLOW LEARNER IN BIOLOGICAL SCIENCE

Conduction of diagnostic tests, identification of slow learner and gifted children, selection of suitable learning activities, materials (self learning materials), assignments for talented students, Designing suitable remedial teaching, Strategies based on difficulties faced by slow learners

UNIT 3 : CURRICULAR REFORMS IN BIOLOGICAL SCIENCE

Analysis of the present secondary school curriculum in biological science (CBSE, State) with respect to (1) principles of curriculum construction, (2) national goals, (3) nature and structure of the subject and (4) resources and personnel available to transact the same in classroom

Biological Sciences curriculum, study-themes, three versions – blue, green and yellow – Laboratory blocks, invitation to enquiry, Nuffield 'O' and 'A' level Biology in modernizing biology

National Curriculum – role of NCERT in construction and improvement of curriculum

Evaluation of textbook – using a standard tool

Evaluation of source book using a standard tool

UNIT 4 : BIOLOGY LABORATORY : DESIGN & MANAGEMENT

Principle design of Science laboratory for secondary schools, location, norms with reference to lighting, ventilation, working space and flexibility of its functions, ancillary facilities in the science laboratory – storeroom, nature corner, preparation room, procuring things, registers to be maintained, care of equipment, glasswares, first aid and safety measures, preparation of necessary chemicals and reagents

UNIT 5 : PROFESSIONAL DEVELOPMENT OF BIOLOGICAL SCIENCE TEACHERS

Professional competencies of biology teachers and need for periodic renewal, types of inservice programmes for Biology teachers, participation in seminars/conferences, professional literature for Biology teachers – reference books, journals, reports, teacher/school bulletins, C D Rom etc , effective mode of transacting inservice programmes in Biology

(Critical appraisal of Internship experiences will be an integral component of all the units)

Sessional Assessment :

1	2 Tests or 1 Test and 1 Assignment	20 marks
2	Development of resource unit	10
3	Textbook Evaluation	10
4	Review of Research articles related to Biological Science	10
Total		: 50

References:

- 1 Biology Teachers' Handbook by E Klinchmann
 - 2 Nuffield Biology Text and Teachers' Guides (Longmans, London)
 - 3 B S C S Text – Molecules to Man (Houghton Mifflin, Boston)
 - 4 Preparation and Evaluation of Textbooks in Science (NCERT, New Delhi)
 - 5 The Teaching of General Science in Tropical Secondary Schools by H N Saunders (Oxford University Press, London)
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V SEMESTER B.Sc.Ed.

5.6 #TOC-1 : TEACHING OF COMPUTER SCIENCE – 1

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks: 150

Sessional : 50

Terminal : 100

OBJECTIVES: On completion of the instruction, the students will be able to describe the role of computers with respect to school and society, describe the role of computers in education, equip with the skills of planning a lesson in computer science, prepare, select and use suitable teaching aids

COURSE CONTENT:

UNIT 1 : NATURE AND SCOPE OF COMPUTER SCIENCE

Concept and dimensions of computer science, unique features Why to study Computer Science? Computers as Tools for Information Systems, Information Technology – concepts, dimensions and applications Computers and communication channels – concept of languages

UNIT 2 : AIMS AND OBJECTIVES OF TEACHING COMPUTER SCIENCE IN SECONDARY SCHOOL

Need for studying computer science – objectives of teaching computer science to enhance the logical and physical aspects of data processing, information usage, translation of objectives into applications pertaining to logic

UNIT 3 : METHODS OF TEACHING INFORMATION TECHNOLOGY

Expository method, Demonstration methods, Problem-solving approaches, Self-learning approaches, Educational games, Project methods and Simulation

UNIT 4 : CONTENT ANALYSIS AND DESIGN OF LEARNING EXPERIENCES

Content analysis of Computer Science books for secondary schools – Identifying teaching points, design of learning experiences

UNIT 5: METHODS OF TEACHING THROUGH IT AND DESIGN OF TEACHING AIDS

Discussion on various methods of teaching through Information Technology – Designing of teaching aids (besides computers)

Sessional Assessment:

1	Tests(One Test and One Assignment)	25 marks
2	Writing Objectives/Content Analysis	10
3	Design of Teaching Aids	15
Total		: 50

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6.6 # TOC-2: TEACHING OF COMPUTER SCIENCE-2

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks : 150

Sessional : 50

Terminal : 100

OBJECTIVES: On completion of the instruction, the students will be able to equip with the skills of planning unit and lesson plans, comprehend the merits of various test items, develop suitable knowledge level, skill based and project based test items, acquire with the skills of handling teaching-learning situations by observation of lessons

COURSE CONTENT:

UNIT 1 : CURRICULA AND PEDAGOGICAL ANALYSIS OF SECONDARY SCHOOL COMPUTER SCIENCE

The topics which are to be taught at secondary level are to be included
Application of relevant learning theories

UNIT 2: PLANNING FOR TEACHING COMPUTER SCIENCE

Selecting content for instruction – organizing the content, stating instructional objectives, identifying the behavioural terms, selection of appropriate strategies, teaching-learning materials and learning experiences Lesson planning and their importance in the teaching-learning process

UNIT 3: EVALUATION OF LEARNING CONCEPTS IN TEACHING COMPUTER SCIENCE

Evaluation – Construction of unit tests, design blue print scheme of evaluation and question analysis, design of evaluation techniques using computers Writing different types of evaluation items, traditional (skill based, knowledge based and project based) and terminal modes (hands on experience), self-evaluating techniques, competency based evaluation, development of question banks

UNIT 4 : OBSERVATION

Purpose and scope – Rationale and format, recording of observations of different teaching-learning situations

UNIT 5 : UNIT/LESSON PLAN AND CONSTRUCTION OF TEST ITEMS

Preparation of unit and lesson plans in Computer Science – Construction of unit tests – Evaluation of unit test scores – Preparation of evaluation records

Sessional Assessment:

1	Tests (One Test and One Assignment)	25 marks
2	Development of Unit Plan	10
3	Development of Lesson Plan	10
4	Test items	05
	Total	: 50

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7.7 # TOC-3 : TEACHING OF COMPUTER SCIENCE-3

Contact Hrs per Week: 4

Exam Duration : 3 hrs

Max Marks: 150

Sessional : 50

Terminal : 100

OBJECTIVES: On completion of the instruction, the students will be able to evaluate curriculum and instructional materials in computer science, prepare instructional materials in computer science for secondary schools, understand the design and organization of computer science laboratory, develop computer assisted learning materials

COURSE CONTENT:

UNIT 1:

Project Work on Internship Records

UNIT 2:

Evaluation of Computer Science Curriculum of CBSE, NCERT, States and recent curriculum of Intel

UNIT 3:

Selection of Resource Materials for teaching Computer Science

UNIT 4

Computer Laboratory design and management – Use of hardware and software – human computer interaction – Simple troubleshooting

UNIT 5.

Project work on developing computer assisted learning materials

Sessional Assessment:

1	Tests(One Test and One Assignment)	25 marks
2	Analysis of Internship Records	05
3	Curriculum Analysis	05
4	Laboratory Management	05
5	Computer Assisted Learning Material	10
	Total	: 50

VII SEMESTER B.Sc.Ed.

7.2 & 7.3 # IIT : INTERNSHIP IN TEACHING

Duration: 6 Weeks

Sessional Marks: 150 + 150 = 300

OBJECTIVES To provide on the job/field experience to the students to develop competencies and skills required for effective classroom teaching, class management, evaluation of student learning, organization of cocurricular activities, working with the community, to enable students to develop proper professional attitudes, values and interests, to establish a closer professional link between RIE Mysore (RIEM) and schools in the region

COURSE CONTENT:

UNIT 1: ORGANISATION

Internship in teaching will be organized in three phases viz pre-internship, internship and post-internship The duration of internship proper will be 6

weeks and will be organized in selected cooperating schools of the southern region. Pre-internship and post-internship activities will be organized at the Institute. Necessary orientation to the cooperating teachers and Heads will be provided at the Institute or at the respective centers. An Internship Committee with representatives from the Departments of Education, Science and General Education will look after the academic and administrative aspects of the internship programme.

UNIT 2: INTERNSHIP ACTIVITIES

The various activities to be performed during the three phases of internship are as follows

A. *Pre-Internship*

- i) Selection of cooperating schools
- ii) Holding of the conference of cooperating teachers and Headmasters, and Meeting of the student-trainees with the respective teachers and Headmasters of the cooperating schools
- iii) Activities by Students
 - a) Planning and preparing for teaching
 - b) Getting acquainted with the school environment
 - c) Observation of teaching
 - d) Initiation to teaching (field experience relating to the above will be provided in the Demonstration School attached to RIEM)

B. *Internship*

- i) Getting acquainted with the cooperating schools, observation of teaching and time-scheduling for teaching and other activities
- ii) Planning and preparation for teaching (2 school subjects)
- iii) Teaching
- iv) Evaluation
- v) Participation in school activities and
- vi) Participation in community work

C. *Post Internship*

- i) Seeking reactions of students, cooperating teachers and headmasters and Institute supervisors through inventory, interview and conference as feedback
- ii) Follow-up, remedial and strengthening activities to be taken up by the RIEM

UNIT 3: EVALUATION AND SCHEME OF ASSESSMENT

Evaluation of performance during Pre-Internship and Internship will be done on the basis of assessment of Institute supervisors, cooperating teachers, headmasters and students, self-appraisal. The scheme of assessment will be as follows

Weightage	Marks	
	Subject 1	Subject 2
1 Pre-internship	20	20
2 Teaching	100	100
3 Observation Record	10	10
4. Evaluation Record	10	10
5 Activity Record	10	10
Total	: 150	150

I SEMESTER B.Sc.Ed.

1.1 # E-1 : ENGLISH

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES:

- 1 To develop the four skills in the English language i.e listening speaking, reading and writing
- 2 To internalize grammar rules so as to facilitate fluency in speech and writing
- 3 To develop independent reading skills and reading for appreciating literary works
- 4 To develop functional and creative writing skills

COURSE CONTENT:

UNIT 1: DESCRIPTIVE GRAMMAR

1 Concord – Subject-verb agreement

2 Tenses

a) Simple present

- i) Habitual action
- ii) General truths
- iii) Future time
- iv) Verbs of state
- v) Verbs of perception
- vi) Verbs of sensation
- vii) Narration
- viii) Use of simple present for demonstration & commentaries
- ix) Present Perfect, present perfect continuous
- x) Present continuous also indicative of future action

b) Simple Past

- i) Past time reference
- ii) Present time reference
- iii) Future time reference
- iv) Past continuous
- v) Past perfect, past perfect continuous

UNIT 2: COMPREHENSION (LISTENING AND READING)

To be based on suitable supplementary material including the following

- a) Intermediate Comprehension Passages - D Byrne
- b) Comprehension and Precis Pieces for Overseas students
- L A Hill & RDS Fielden
- c) Scientific English Practice - G C Thornley for BscEd
- d) Multiple Choice Questions in English – John Eynon

UNIT 3 . GUIDED COMPOSITION

(Will be mainly based on the books mentioned in Comprehension, where exercises for composition form a part of the passages for comprehension)

UNIT 4: LITERATURE – 3 OR 4 ESSAYS TO BE CHOSEN BY THE TEACHER

UNIT 5: LITERATURE: A novel, 'Things Fall Apart' – Chinua Achebe

Sessional Assessment:

1	Two Tests	15 marks
2	One assignment	05
	Total	: 20

Books for reference and working on grammar items:

- 1 An Intermediate English Grammar Book, S Pit Corder
- 2 A Practical English Grammar Combined Exercises with Key A J Thomson and A V Martinet
- 3 Oxford Advanced Learner's Dictionary, A S Hornby
- 4 Modern Grammar – Krishnamurthy

II SEMESTER B.Sc.Ed.

2.1 # E-2 : ENGLISH

Contact Hrs per Week: 4
Exam Duration : 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES:

- 1 To develop the four skills in the English language i.e. listening, speaking, reading and writing
- 2 To internalize grammar rules so as to facilitate fluency in speech and writing
- 3 To develop independent reading skills and reading for appreciating literary works
- 4 To develop functional and creative writing skills

COURSE CONTENT:

- UNIT 1** Present perfect, present progressive, present perfect progressive, past perfect, past progressive, future perfect, future perfect progressive
- UNIT 2 : DESCRIPTIVE GRAMMAR**
1) Modals 2) Question forms 3) Nominal group -
i) Determiners ii) Adjectives iii) Some important prepositions, iv) Punctuation marks,
- UNIT 3 : COMPREHENSION**
To be based on suitable supplementary material including the following
1 Intermediate Comprehension Passages - D Byrne
2 Further Comprehension & Precis
pieces For Overseas Students - L A Hiss & R D S Fielden
3 Scientific English Practice - G C Thornley
- UNIT 4. GUIDED COMPOSITION**
(Will be mainly based on the books mentioned in Comprehension, where exercises for composition form a part of the passages for comprehension)
- UNIT 5: LITERATURE – CONTEMPORARY INDIAN SHORT STORIES**
Edited by Bhabani Bhattacharya
1 The Golden Watch - Mulkraj Anand
2 A Defective Coin - Rama Das
3 Boatman Tarini - Tara Shankar Banerjee
4 Birthday - Vaikom Mohammed Bashir
5. Skeleton in the Cupboard -B C Ramachandra Sharma
6. The Earning Son - Chunelal K Madia
LITERATURE : OTHELLO – WILLIAM SHAKESPEARE

Sessional Assessment:

1	Two Tests	15 marks
2	One assignment	05
	Total	20

Books for Reference and working on grammar items:

- 1 An Intermediate English Grammar Book, S Pit Corder
- 2 A Practical English Grammar Combined Exercises with Key A J Thomson
and A V Martinet
- 3 Oxford Advanced Learner's Dictionary, A S Hornby
- 4 Living English Structure – Standard Allen

III SEMESTER B.Sc.Ed

3.1 # E-3 : ENGLISH

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES:

- 1 To develop the four skills in the English language i.e listening speaking, reading and writing
- 2 To internalize grammar rules so as to facilitate fluency in speech and writing
- 3 To develop independent reading skills and reading for appreciating literary works
- 4 To develop functional and creative writing skills

COURSE CONTENT:

UNIT 1: LANGUAGE WORK

- 1 Revision of Tenses
- 2 Adjectival Phrases, Relative Pronouns
- 3 Coordinating Conjunctions, Sentence Connectors
- 4 Clauses
 - 1) adjectival (defining and non-defining)
 - 2) adverbial (including conditional clauses)
 - 3) noun clause

UNIT 2: ADVANCED COMPREHENSION

Focus on the development of specific comprehension skills lwith particular reference to the following

- 1 ability to recall
- 2 ability to infer
- 3 ability to link ideas/see relationships
- 4 ability to discriminate and assess

Suitable supplementary material will be used in addition to the following books

- 1 English for proficiency - D H Spencer
- 2 The English We Use - R A Close
- 3 Advanced Comprehension Passages - L A Hill

UNIT 3 : FREE COMPOSITION

With special reference to the following

- 1 modification
- 2 sequencing
- 3 paragraph writing/letter writing
- 4 note making

UNIT 4 : LITERATURE – POEMS

- 1 London - William Blake
- 2 My Heart Leaps Up - William Wordsworth
- 3 Frost at Midnight - Samuel Taylor Coleridge
- 4 The Second Coming - W B Yeats
- 5 The Journey of the Magie - T S Eliot
- 6 Thought Fox - Ted Hughes
- 7 The Night of the Scorpion - Nizzim Ezekiel

UNIT 5 . LITERATURE – LITERARY PIECES/ ANALYSIS WITH REFERENCE TO THE POEMS TAUGHT

Sessional Assessment:

1	Two Tests	15 marks
2	One assignment	05
	Total	: 20

Books for Reference and working on grammar items

- 1 An Intermediate English Grammar Book, S Pit Corder
- 2 A Practical English Grammar Combined Exercises with Key A J Thomson and A V Martinet
- 3 Oxford Advanced Learner's Dictionary, A S Hornby
- 4 Grammar, Frank Palmer

IV SEMESTER B.Sc.Ed.

4.1 # E-4 : ENGLISH

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES:

- 1 To develop the four skills in the English language i.e. listening, speaking, reading and writing
- 2 To internalize grammar rules so as to facilitate fluency in speech and writing
- 3 To develop independent reading skills and reading for appreciating literary works
- 4 To develop functional and creative writing skills

COURSE CONTENT

UNIT 1: LANGUAGE WORK

- 1 Revision Question forms, clauses & modals
- 2 Transitive and intransitive verbs
- 3 Verbal Nouns Participles and Infinitives

UNIT 2: ADVANCED COMPREHENSION

UNIT 3: FREE COMPOSITION

As mentioned in Semester III against Comprehension and Composition

UNIT 4: LITERATURE – Arms and the Man – Bernard Shaw

UNIT 5: LITERATURE

- 1 Preface to Plays Pleasant (Arms and the Man) – Bernard Shaw
- 2 Nature and Causes of War - Aldouse Huxley

Sessional Assessment:

1	Two Tests	15 marks
2	One assignment	05
	Total	20

Books for Reference and working on grammar items:

- 1 An Intermediate English Grammar Book, S Pit Corder
- 2 A Practical English Grammar Combined Exercises with Key A J Thomson and A V Martinet
- 3 Oxford Advanced Learner's Dictionary, A S Hornby
- 4 Grammar, Frank Palmer

I SEMESTER B Sc.Ed.

1.2 # RL-1.2.1 : REGIONAL LANGUAGE - Hindi

Contact Hrs per Week : 4
Exam Duration : 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES:

To develop in the students functional and communication skills in Hindi, so as to enable them to use it as link language for communication purpose
To develop values of liberalism and an insight into the cultural heritage which remains embodied in the literary output of Hindi language

COURSE CONTENT

Language, comprehension, composition and literature

- UNIT 1 :** Nature and scope of language, origin and development of Hindi, importance of Hindi
Following Adhyay from BHASHA VIGYAN KI BHUMIKA by Devendranath Sharma, Published by Radhakrishna Prakashan, New Delhi
Name of the Adhyay Bhasha, Bhasha Ka Upyog and Bhasha Ki Visheshtayen aur Pravritiyan Hindi Ka Mahatwa Adhyay from Adhunik Hindi Vyakaran aur Rachanay Vasudev Nandan prasad, Bharati Bhavan, Patna-3
- UNIT 2 .** Hindi Grammar
Important chapters from Vyavaharik Hindi Vyakaran? By Dr hardev Bahri, published by Sanjay Book Centre Golghar Varanashi-221 001 and Adhunik Hindi Vyakaran aur Rachna by Vasudev Nandan Prasad
- UNIT 3** Essay, letter and precis writing
Prof Adhunik Hindi Vyakaran Rachna by Vasudev Nandan Prasad, published by Bharati Bhawan, Thakurani Road, kadamkuan, Patna-3
- UNIT 4 :** Introduction of various literary forms of Hindi as - Kahani, Natak, Ekanki, Upanyas, Nibandh, Jivani, Sansmaran, Atmakatha, INai Kavita, Nai Kahani, Rekhachitra, Report, Khand Kavya and Mahakavya (Underlined forms from Adhunik Hindi Vyakaran aur Rachna of Vasudev Nandan Prasad will be prescribed for examination)
- UNIT 5 :** KHATHA BHAG OF HINDI Gadya Sanbgarah published by Prasanga, University of Mysore
Following Rachnayen will be taught (from starting to end of part I of the book)

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

II SEMESTER B.Sc.Ed.

2 2 # RL-2.2.1 : REGIONAL LANGUAGE - Hindi

Contact Hrs per Week : 4

Exam duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES.

To develop in the students functional and communication skills in Hindi, so as to enable them to use it as link language for communication purpose

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT:

- UNIT 1** • Detailed study Poetry from Hindi Padhya Prasoon by Narmadeshwar Prasad Chaturvedi
Following poets poetry will be taught as Tulsidas, Surdas, Kavirdas, Jayasi, Meera Bai (One poetry from each poets starting poetries)
- UNIT 2** Non/detailed study – Kathbhag of Hindi Gadhya Sangara, published by Prasaranga, University of Mysore Mysore (only stories will be taught)
- UNIT 3** Conversation
- UNIT 4** Four Ekanks from Ekanki Koustubh Edited by Dr P R Srinivas, Shastri, Karnataka Mahila IHindi Seva Samiti Chamarajpet Bangalore-18
Following Ekanki will be taught as
Strike by Bhuvneshwar, Deepdan by, Ramkumar Verma,
Bhor Ka Taara by Jagdeesh Chandra Mathur,
Maan by Sri Vishnu Prabhakar
- UNIT 5.** Five Nibandh from Vichar aur Vitarka by Acharya Hazari Dwivedi (From starting to five)

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

III SEMESTER B.Sc.Ed

3.2 # RL-3.2.1 : REGIONAL LANGUAGE - Hindi

Contact Hrs per Week : 4

Exam Duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES:

To develop in the students functional and communication skills in Hindi, so as to enable them to use it as link language for communication purpose

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output

COURSE CONTENT:

UNIT 1 : Detailed study – poetry from Ritikah to Adhunikkah. As Bihari, Raskhan, Harioudh, Maithili Sharan Gupta, Prasad, Pant, Nirala Mahadevi Verma, Makhanlal Chaturvedi Subhadra Kumari Chouhan, Dinkar will be taught, from Hindi Padhya Prasoon by Narmadeshwar Prasad Chaturvedi (only one starting poem of each poets will be taught)

UNIT 2 : Non-detailed study One Natak – Ek Taave Ki Aankh by Mani Madhukar will be taught

UNIT 3 : Composition

UNIT 4 : Collection of stories from Katha Koustubh, edited by Prof Tippe Swamy
Following stories will be taught-
Mata - Vimata by Bhishma Sahni
Bhagat KiGat by Harishankar Parsai
Panch Light by Fanishwar Nodh Renn
Pitrishok by Mehra Nisha Pamrej

UNIT 5: Conversation

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

IV SEMESTER B.Sc.Ed.

4.2 # RL-4.2.1 : REGIONAL LANGUAGE - Hindi

Contact Hrs per Week : 4

Exam Duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES:

To develop in the students functional and communication skills in Hindi, so as to enable them to use it as link language for communication purpose

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT.

UNIT 1 : One Upanyas Sufah Dophar Sham by Kameshwar, published by Rajpals and Sons, Kashmiri Gate, Delhi

UNIT 2 : Non-detailed study One natak Yug Yug Kranti by

UNIT 3 Translation, practical and theory
Anuvadkala Sidhanta and Prayog by Dr Kailash Chandra
Bhatra, published by Taxshila Prakashan, 23/4761, Ansari
Road, Dhariya Ganj, New Delhi-2

UNIT 4 Computer typing in Hindi

UNIT 5 Report Writing

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

I SEMESTER B.Sc Ed

1.2 # RL-1.2.2 : REGIONAL LANGUAGE - Kannada

Contact Hrs per Week : 4

Exam Duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES

To develop in the students functional and communication skills in Kannada, so as to enable them to teach their respective subjects through their regional language effectively

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT:

UNIT 1 DESCRIPTIVE GRAMMAR

- i) Sandhi
- ii) Tatsama – Tadbhava

UNIT 2: FUNCTIONAL LANGUAGE

- i) Conversation
- ii) Group Discussion

UNITS 3 & 4 : POETRY – MODERN

- I) Kalki - Kuvempu
- II) Sabhyata Devate – Kuvempu
- III) Barigodagalige Samadhana – K S Narasimhaswamy
- IV) Thungabhadre – K S Narasimhaswamy
- V) Kaniveya muduka – Pu Thi Na
- VI) Nanna avathara – M Gopalakrishna Adike

Selected from Aunika Kannda Kavya Part I
University of Mysore, Mysore

UNIT 5 : LITERATURE

Collection of Short Stories

- i) Mochi – Bhartaipriya
- ii) Kallina Kolalu – Chaturanga
- iii) Radheya Kshame – Ananda
- iv) Cappaligalu – Sara Abubakkar
- v) Prakriti – U R Ananthamurthy

Selected from Sanna Kathakalu
Mysore University, Mysore

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

II SEMESTER B.Sc.Ed.

2.2 # RL-2.2.2 : REGIONAL LANGUAGE - Kannada

Contact Hrs per Week : 4

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Exam Duration : 3 Hrs

Max. Marks ; 100

Sessional : 20

Terminal : 80

OBJECTIVES:

To develop in the students functional and communication skills in Kannada, so as to enable them to teach their respective subjects through their regional language effectively

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT:

UNIT 1 : FUNCTIONAL LANGUAGE

- i) News Reporting
- ii) Interviews

UNIT 2 :

- i) Translation (English to Kannada)
- ii) Descriptive Grammar – Samasa

UNIT 3 & 4. NAVYA KAVYA

- i) Charitreya prashnya Patrike
- ii) Biliya Hookale Kavithe Gorikale mele
- iii) Shilage Hoovina vanki
- iv) Maneyintha manege
- v) Gadiyaradangiya munde

(Selected from Ayda Kavanagalu by K S Narasimhaswamy)

UNIT 5 : COLLECTION OF ESSAYS

- i) Chatavannu kurithu – B G L Swamy
- ii) Manushya – G R Lakshmana Rao
- iii) Manasu – M Shivaram
- iv) Janapatha Geethe – C P K

(Selected from Gadya Vihara Part III)

Mysore University, Mysore

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

III SEMESTER B.Sc.Ed.

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3.2 # RL-3.2.2 : REGIONAL LANGUAGE - Kannada

Contact Hrs per Week : 4
Exam Duration : 3 Hrs

Max. Marks : 100
Sessional : 20
Terminal : 80

OBJECTIVES:

To develop in the students functional and communication skills in Kannada so as to enable them to teach their respective subjects through their regional language effectively

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT:

UNIT 1. FUNCTIONAL LANGUAGE

- i) Letter Drafting
- ii) Essay writing

UNIT 2 :

- i) Regional Variations in Kannada
- ii) Usage of Idioms, Phrases, proverbs

UNITS 3 & 4 : MEDIEVAL AND FOLK

- i) Halatorege Bellada kearu - Basavanna
- ii) Chintayemuppu santhoshave javvana – Rathnakaravarne
- iii) Adavanama jola Ulidava Namahadu – Folk

(Selections from Kavya Sanchaya Part III)
Mysore University, Mysore

UNIT 5 : NOVEL

Bettada Jeeva by Shivarama Karantha

Sessional Assessment : 3 Tests OR 2 Tests and 1 Assignment

IV SEMESTER B.Sc.Ed.

4.2 # RL-4.2 2 : REGIONAL LANGUAGE - Kannada

Contact Hrs per Week : 4

Exam Duration : 3 Hrs

Max. Marks ; 100

Sessional : 20

Terminal : 80

OBJECTIVES:

- To develop in the students functional and communication skills in Kannada, so as to enable them to teach their respective subjects through their regional language effectively
- To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT:

UNIT 1: LITERARY CRITICISM

1 Parampare Maththu Samakaalina Kannada Sahithya

From **Anivarya** by G H Nayak

2.Swathantroththara Kannada Sahithya Nanna Annisikegalu

From **Anivarya** by G H Nayak

3 Pragathisheela - L S Sheshagiri Rao

4 Bharathiya Samskruthi Maththu Lekhakaru- U R AnanthaMurthy

(3 and 4 Selections from **Shathamaanada Saahithya Vimarshre** Ed H S Raghavendra , pp 238 & pp 448 Karnataka Sahithya Academy, Bangalore)

UNIT 2: TECHNICAL AND SCIENTIFIC LANGUAGE IN KANNADA

UNITS 3 & 4 : POETRY ANCIENT

1 Melpu belpanaligum- Pampa

2 Abhimaanavane balvidivididhen-Ranna

3 Paligum paapakkam anjadhavar eegaiyyar- Nagachandra

(Kaavya Sanchaya-3 –Mysore University, Mysore)

UNIT 5. LITERATURE-DRAMA

Beralge koral- Kuvempu

Sessional Assessment : 3 Tests OR 2 Tests and 1 Assignment

I SEMESTER B.Sc.Ed.

1.2 # RL-1.2.3 : REGIONAL LANGUAGE - Malayalam

Contact Hrs per Week : 4
Exam Duration : 3 Hrs

Max. Marks ; 100
Sessional : 20
Terminal : 80

OBJECTIVES:

- To develop in the students functional and communication skills in Kannada, so as to enable them to teach their respective subjects through their regional language effectively
- To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT:

UNIT 1: DESCRIPTIVE GRAMMAR

1. Sandhi

(Lopam, Agamam, Adesam, Dvitvam----- Important Sandhis only
Ref Kerala Paniniyam)

UNIT 2 : FUNCTIONAL LANGUAGE (conversation & group discussion)

UNITS 3 & 4 : MODERN POEMS

Kavya maala – 2- University of Kerala publication

- 1 Mazhuventa katha (Parasuraman)
- 2 Vanarodanam
- 3 Shanta
- 4 Kochiyile Vrikshangal
- 5 Bharathiyam

UNIT 5: LITERATURE –SHORT STORIES

Kathaamalika- 1 (University of Kerala publication)

- 1 Katal theerathe
- 2 Shavadaham
- 3 Ammayum makanum
- 4 Perumazhayude Pittennu
5. Chaya
- 6 Hargi
- 7 Kani

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

II SEMESTER B.Sc.Ed.

2.2 # RL-2.2.3 : REGIONAL LANGUAGE - Malayalam

Contact Hrs per Week : 4

Exam Duration : 3 Hrs

Max. Marks ; 100

Sessional : 20

Terminal : 80

OBJECTIVES:

- To develop in the students functional and communication skills in Malayalam, so as to enable them to teach their respective subjects through their regional language effectively
- To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT:

UNIT 1: DESCRIPTIVE GRAMMAR

1 Samasam and Alangaram (Important Samasam and alangarams only)

2 Vinayecham

UNIT 2:

Translation (English to Malayalam)

UNIT 3: LITERATURE - Short prose pieces(collection of essays)

Bharatha pariyatanam – Kutti Krishna Marar

1 Udhathinte Parinamam

2 Amba

3 Karnante arangattam

4. Nishpakshanaya – Balaraman

UNITS 4 & 5: LITERATURE- A short novel

Entuppuppakkoranaondarnu (vikkom muhammed Basheer)

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

III SEMESTER B.Sc.Ed.

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3.2 # RL-3.2 3 : REGIONAL LANGUAGE - Malayalam

Contact Hrs per Week : 4
Exam Duration : 3 Hrs

Max. Marks ; 100
Sessional : 20
Terminal : 80

OBJECTIVES.

- To develop in the students functional and communication skills in Malayalam, so as to enable them to teach their respective subjects through their regional language effectively
- To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT:

UNIT 1: FUNCTIONAL LANGUAGE

- 1 Letter writing
- 2 Essay writing

UNIT 2. STYLES OF WRITING (usages of idioms, phrases , proverbs etc)

(References- Sahithya sahyam, Malayala saily, Thettum Seriyum)

UNIT 3: LITERATURE- travelogue

Paathira Suryante Naattil- S K Pottekkad
(D C Books, Kottayam)

UNITS 4 & 5: LITERATURE- Ancient and medieval Poems

1. Karna parvam (Ezhuthacha)
2. Veena Poopu (kumaran Asan)

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

IV SEMESTER B.Sc.Ed.

4.2 # RL-4.2.3 : REGIONAL LANGUAGE - Malayalam

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Contact Hrs per Week : 4
Exam Duration : 3 Hrs

Max. Marks ; 100
Sessional : 20
Terminal : 80

OBJECTIVES:

- To develop in the students functional and communication skills in Malayalam, so as to enable them to teach their respective subjects through their regional language effectively
- To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT:

UNIT 1: FUNCTIONAL LANGUAGE

1. Précis Writing
- 2 Interview

UNIT 2. STYLE OF WRITING (Administrative And journalistic)

UNIT 3 . LITERATURE- Prose drama

Saketham –C N Sreekantan Nair

Units 4 & 5. History of Literature & Major Movements in Modern Literature

(References Kairaliyutekatha- Prof N Krishnapillai)

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

I SEMESTER B.Sc.Ed.

1.2 # RL-1.2.4 : REGIONAL LANGUAGE - Tamil

Contact Hrs per Week: 4
Exam Duration: 3 Hrs

Max Marks: 100
Sessional : 20
Terminal: 80

OBJECTIVES: To develop in the students functional and communication skills in Tamil, so as to enable them to teach their respective subjects through their regional language effectively

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT.

UNIT 1 : Descriptive grammar
Sandhi
Ref Book Tamilil Ningalum Thavarillamal Ezhuthalam – Dr
Porko

UNIT 2 . Functional Language
i) Group Discussion
ii) Conversation

UNIT 3: Poetry
& Modern Poetry –
UNIT 4
i) Ikkalak kavithaikal
ii) Kannan En Sevagan
iii) Thiru Arutpa

An Anthology of Tamil Poetry
(For First Year Degree Classes)
University of Mysore, Mysore

UNIT 5 : Literature – Collection of Short Stories
Naarru – (Collection of short stories)
Vaanathi Pathippagam
13 Deenadayalu Street
T Nagar, Chennai-600017

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

II SEMESTER B.Sc.Ed.

2.2 # RL-2.2.4 . REGIONAL LANGUAGE - Tamil

Contact Hrs per week: 4
Exam Duration: 3 hrs

Max Marks: 100
Sessional : 20
Terminal: 80

OBJECTIVES. To develop in the students functional and communication skills in Tamil, so as to enable them to teach their respective subjects through their regional language effectively
To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT

- UNIT 1 :** Functional Language
i) News Reporting
ii) Interview
- UNIT 2 :** Translation
(English to Tamil)
Ref Book Mozhi Peyarppiyal
Siva Shanmugam
Annam Publications
Sivagangai (T N)
- UNIT 3 & UNIT 4:** Poetry – Medieval
i) Periya Puranam
ii) Naladiyar
An Anthology of Tamil Poetry
(For First Year Degree Classes)
University of Mysore, Mysore
- UNIT 5:** Literature
Collection of Essays
Ariviyal Tamizhakkam – S V Shanmugham
New Century Book Housel (P) Ltd
41-B SIDCO Industrial Estate
Chennai-600 098

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

III SEMESTER B.Sc Ed.

3.2 # RL-3.2 4 : REGIONAL LANGUAGE - Tamil

Contact Hrs per Week: 4
Exam Duration: 3 Hrs

Max Marks. 100
Sessional : 20
Terminal: 80

OBJECTIVES: To develop in the students functional and communication skills in Tamil, so as to enable them to teach their respective subjects through their regional language effectively
To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT.

UNIT 1 : Functional Language

- ii) Letter Drafting
- iii) Essay Writing

UNIT 2 : i) Styles of writing ii) Usage of Idioms, Phrases, Proverbs, etc

Ref Nalla Tamizh Ezhutha Veenduma
A K Paranthamanar
Pari Nilayam
Chennai-600 001

UNIT 3 & Poetry – Medieval

- ### **UNIT 4 : i) Thirukkural ii) Silappathikaram iii) Perumal Thirumozhi**

An Anthology of Tamil Poetry
(For Second Year Degree Classes)
University of Mysore, Mysore

UNIT 5 : Literature - Novel Onpathu Rupaay Nottu Thangar Pacchan Sempulam, No 50, 5th Street Ekkattu Thangal Chennai-600 097

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

IV SEMESTER B.Sc.Ed.

4 2 # RL-4 2.4 : REGIONAL LANGUAGE - Tamil

Contact Hrs per Week: 4

Exam Duration: 3 Hrs

Max Marks: 100

Sessional : 20

Terminal: 80

OBJECTIVES: To develop in the students functional and communication skills in Tamil, so as to enable them to teach their respective subjects through their regional language effectively

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT.

- UNIT 1 :** Functional Language
i) Precise Writing
ii) Book Reviewing
- UNIT 2 :** Technical and Scientific Paper writing
Ref. Language in Science
M S Thirumalai
Geetha Book House
Mysore
- UNIT 3 &:** Poetry Ancient
UNIT 4 i) Nedunal Vaadai
ii) Kalithogai
- An Anthology of Tamil Poetry
(For Second Year Degree Classes)
University of Mysore, Mysore
- UNIT 5:** Literature –Drama
Thanneer Thanneer
Komal Swaminathan
Vanathy Pathipagam
13 Deenadayalu Street
T Nagar, Chennai-600 017

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

I SEMESTER B.Sc.Ed.

1.2 # RL-1.2.5 : REGIONAL LANGUAGE - Telugu

Contact Hrs per Week : 4
Exam Duration : 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES: To develop in the students functional and communication skills in Telugu, so as to enable them to teach their respective subjects through their regional language effectively

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT.

- UNIT 1 :** Descriptive grammar
Sandhi
(Savarna deergha, Guna, Vridhi, Thrika, Yanadesa, Anunasika, Visarga, Atwa, Itwa, Utwa and Yadagama Sandhis)
- UNIT 2 :** Functional Language
i) Group Discussion
ii) Conversation
- UNIT 3 &
UNIT 4 :** Poetry
Modern Poetry
i) Nireekshanam - Pingali-Katuri
ii) Madhava Varma - Visvanatha Satyanarayana
iii) Vyatyayamu - G Jashua
iv) Sivajee Sheelamu - Gadiyaram Venkata Sesha Sastri
v) Sveccha ganamu - Krishnasastri
vi) Desa Charitralu - Sri Sri
vii) Amritam Kurisina Ratri - Tilak
- (Selections from 'Telugu Sahitya Sravanthi' Published by Prasaranga, Mysore University, Mysore)
- UNIT 5 :** Literature
Collection of Short Stories
'Velu Pillai' (Collection of short stories) by C Ramachandra Rao, available at Visalandhra Book House, Abids, Hyderabad)

Sessional Assessment 3 Tests OR 2 Tests and 1 Assignment

II SEMESTER B Sc Ed.

2.2 # RL-2.2.5 : REGIONAL LANGUAGE - Telugu

Contact Hrs per Week : 4
Exam duration : 3 Hrs

Max Marks 100
Sessional : 20
Terminal : 80

OBJECTIVES: To develop in the students functional and communication skills in Telugu, so as to enable them to teach their respective subjects through their regional language effectively

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT

UNIT 1 : Functional Language

- i) News Reporting
- ii) Interview

UNIT 2 : Translation (English to Telugu)

(Ref.' Anuvada Samasyalu' by Rachamallu Ramachandra Reddy –available at Visalandhra Book House, Abids, Hyderabad)

UNIT 3 & Poetry – Medieval

UNIT 4 : i) Pravaruni Katha – Peddana
ii) Vyasa Nishkasanamu - Sreenathudu
(selections from Telugu Pathagalu, Published by Mysore University, Mysore)

UNIT 5 : Literature

Collection of Essays

- 1 'Andhrula Sanghikacharalu'
- Khandavalli Lakshmi Ranjanam
- 2 'Sri Tirupati Venkata Kavula Avadhana Vidya'
- Veturi Sivarama Sastri
(selections from 'Telugu Sahitya Sravanthi', Prasaraanga, Mysore)

Sessional Assessment : 3 Tests OR 2 Tests and 1 Assignment

III SEMESTER B.Sc.Ed.

3.2 # RL-3.2.5 : REGIONAL LANGUAGE - Telugu

Contact Hrs per Week : 4

Exam duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES: To develop in the students functional and communication skills in Telugu, so as to enable them to teach their respective subjects through their regional language effectively

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT

UNIT 1 : Functional Language

- i) Letter drafting
- ii) Essay writing

UNIT 2 : i) Styles of writing

- ii) Idioms, Phrases, Proverbs, etc

Ref 'Telugu Samethalu' by P Rajeswara Rao

Visalandhra Book House, Abids, Hyderabad

UNIT 3 & Poetry

UNIT 4: Medieval Poetry

- i) Vamana Charithra - Pothana
 - ii) Subhadra Parinayam - Chemakura Venkata kavi
- (Selections from Telugu Sahitya Sravanthi, Prasaranga, Mysore)

UNIT 5 : Literature

Novel 'Chivaraku Migiledi' by Buchi Babu

(available at Visalandhra Book House, Abids, Hyderabad)

Sessional Assessment : 3 Tests OR 2 Tests and 1 Assignment

IV SEMESTER BScEd.

4.2 # RL-4.2.5 : REGIONAL LANGUAGE - Telugu

Contact Hrs per Week : 4

Exam duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES: To develop in the students functional and communication skills in Telugu, so as to enable them to teach their respective subjects through their regional language effectively

To develop values of liberalism and an insight in to the cultural heritage of the region which remains embodied in the literary output of that region

COURSE CONTENT

UNIT 1 : Functional Language

- i) Précis Writing
- ii) Book Reviewing

UNIT 2 : Technical and Scientific Writing
Ref: 'Science Vyasalu' by Kodavatiganti Kutumba Rao
Available at Visalandhra Book House, Abids, Hyderabad

UNIT 3 & Poetry – Ancient

UNIT 4 : i) Damayanthēe Svayamvaram - Nannaya Bhattu
ii) Padmavyuha Bhedanam - Tikkana Somayaji
(Selections from 'Telugu Sahitya Sravanthi', Prasaranga,
Mysore)

UNIT 5 : Literature – Drama
'Kanya Sulkamu' by Gurazada Appa Rao
(available at Visalandhra Book House, Abids, Hyderabad)

Sessional Assessment : 3 Tests OR 2 Tests and 1 Assignment

VII SEMESTER B.Sc.Ed.

7.1 # SS-1 : SOCIAL SCIENCE

Contact Hrs per Week: 4
Exam Duration : 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES:

The study of this course will lead to an understanding of how societies have evolved, the social formations in Indian Society and emergence of the modern Indian state. It will create an awareness about Indian constitution, issues and concerns of Indian society, socio-political changes in contemporary India and progress and development of society in India. It will create an understanding of the social structure of Indian society.

COURSE CONTENT:

UNIT 1 : EVOLUTION OF SOCIETY

Man's many worlds – emergence of Homo-Sapiens, the cultural world – exchange of material and non-material cultures, organic and socio-cultural evolution, technology and social evolution, developments, in ancient, medieval, and modern India, social and nationalist movements, India's struggle for independence

UNIT 2 : INDIAN CONSTITUTION

Preamble, citizenship, fundamental rights, and duties, directive principles, parliament, judiciary, government and elections, and constitutional amendments

UNIT 3: ISSUES AND CONCERNS OF INDIAN SOCIETY

Indian society and its basic components, caste, class, tribe, communal divide, socio-economic inequalities, the scheduled castes, the scheduled tribes and the other backward classes and dynamics of the quest for equality

UNIT 4: SOCIO-POLITICAL CHANGES IN CONTEMPORARY INDIA

Partition of India, reorganization of states, scientific and technological advancement, ethnicity, language and regional identities, unity and diversity and national integration

UNIT 5: PROGRESS AND DEVELOPMENT OF SOCIETY IN INDIA

Indian economy, India as a welfare state, democracy, socialism, secularism, economic planning and five-year plans, globalization, scientific temper, population stabilization, education policy, universalization of elementary education and disaster management

Sessional Assessment: 2 Tests and 1 Assignment

References

1. Humayun Kabir Indian Cultural Heritage
2. R K Mukerjee Cultural History of Modern India
3. Indian Year Book Latest edition
4. Exemplar Materials on Core Elements prepared by NCERT
5. United Nations (1994) Conference on Population and Development – Summary of the programme of action of the International Conference on Population and Development
6. Bharatiya Vidya Bhavan Struggle for Freedom – The History and Culture of Indian People
7. Harrison Paul Population and Sustainable development- Five Years after Rio The Information and External Relation Division
8. David Mandelbaum Society in India, Vol.1 and 2
9. Davis Kingsley Human Society
10. Dube S C Indian Society, NBT, New Delhi
11. Srinivas M N Social Change in Modern India
12. Desai A R Social Background of Indian Nationalism, Popular Prakash, Bombay
13. Singh Yogendra . Tradition and Modernity, Rawat Publications, Jaipur

VIII SEMESTER B.Sc.Ed.

8.1# SS-2 : SOCIAL SCIENCE

Contact Hrs per Week: 4
Exam Duration : 3 Hrs

Max Marks. 100
Sessional : 20
Terminal : 80

OBJECTIVES :

The understanding of the various dimensions of evolution and development of societies will help in developing an understanding of international order and Human Rights issues including gender equality and equity among the students. Study of issues concerning population and adolescence will give an idea about the India's population problem and those of adolescents. The students will also develop an idea about the dangers of HIV/AIDS and drug abuse. It will attempt to develop an awareness and understanding of the close relationship between Science, Technology and Society.

COURSE CONTENT:

UNIT 1: INTERNATIONAL ORDER AND HUMAN RIGHTS

Historical perspective of International Conflicts, disarmaments, international cooperation in the present day, role of international organization, non-aligned movement and regional cooperation. Meaning, scope and significance of Human Rights, historical perspective, overview of human rights organization, issues, rights of children and the disadvantaged groups and, human rights education.

UNIT 2: GENDER EQUALITY AND EQUITY

Difference between sex and gender, social construction of gender, gender identity, gender roles, gender bias, gender equality, and gender equity.

UNIT 3: POPULATION AND DEVELOPMENT

Concept, characteristics, objectives and significance, basic demographic concepts, historical perspective, reconceptualization, population policy, population theories, population as resource, environment and sustainable development, determinants of population change, urbanization and migration.

UNIT 4 : ADOLESCENT AND YOUTH OF THE COUNTRY

Concepts, the process of growing up, changing roles and responsibilities, responsible parenthood, health and education, life skills education in schools. HIV/AIDS/STD Basic information, its prevention and control, behavioural aspects, care and teachers role, drug abuse, general classification of addictive drugs, alcoholism, smoking and steps for avoidance.

UNIT 5: SCIENCE, TECHNOLOGY AND SOCIETY

History of science and scientific method – reason and logic,
Modernization – goals and progress, economic development and
technological change, interrelationship between science,
technology and society, social development and quality of life

Sessional Assessment : 2 Tests and 1 Assignment

References:

- 1 MHRD (1993) AIDS Education for student Youth- A training manual, UTA Headquarters (NSS), Department of Youth Affairs and Sports, Ministry of Human Resource Development, 12/11 Jam Nagar House, New Delhi
- 2 NCERT (2000) Adolescence Education – An awareness training package for secondary teachers, Regional Institute of Education, Mysore.
- 3 Pandey J L, Yadav, Saroj B andl Sadhu Kanan K (1999) Package of basic materials on adolescences education, NCERT, New Delhi
- 4 NCERT and NACO (1994) AIDS Education in Schools – A training package
- 5 Kamala, Bhasin (2000) Understanding Genders, Kali for Women B1/8 Hauz Khas, New Delhi
- 6 NCERT (2000) National Curriculum Framework for School Education, New Delhi
- 7 R D Cornwell World History in the Twentieth Century
- 8 India Yar Book latest edition.
- 9 Srivastava L S, Joshi V P International Relation, 1997. Goel Publishers, Meerut
- 10 E H Carr International Relation between the Two Wars, 1947
- 11 Palmer and Perkins International Relations, 1968
- 12 NCERT (1984) Population Education – A Manual for Teacher Educators, Regional College of Education.
- 13 Seshadri C and Population Education – A national Source Book, Pandey J L (1991) NCERT, New Delhi.
- 14 Rao, Sudha V 'Population and Development' in Margin, Jan-Mar 1992
- 15 Rao, Sudha V 'Population and Quality of Life' in Education in Values – A Source Book, edited by Seshadri C, Khader M A and Adhya G L, NCERT, New Delhi, 1992
- 16 David Mandelbaum Society in India, Vol 1and 2
- 17 Davis Kingsley Human Society
- 18 Dube S C Indian Society,NBT, New Delhi
- 19 Srinivas M N Social Change in Modern India.
20. Antinomies in Society . Andri Betteilli, OUP, 1996

I SEMESTER B.Sc.Ed.

1.4 # 1.4.1 : WORK EXPERIENCE (AGRICULTURE)

Contact Hrs per Week: 2
Exam Duration : Nil

Max Marks: 25
Sessional : 25
Terminal : Nil

OBJECTIVES To enable students to acquire basic skills and practical knowledge in fundamentals of field crops/ vegetables/ fruits/flowers cultivation, livestock, poultry and sericulture, To expose them to correlate the effect of various methods/practices/ treatments on the development of crops, livestock, poultry and sericulture, To expose them to appreciate and explore the world of work and to inculcate the values of dignity of labour

COURSE CONTENT:

- UNIT 1 : Definition of Agriculture and Horticulture and its various branches
- UNIT 2 : Definition of plants and crops
- UNIT 3 : Classification of various crops on the basis of Botanical character, economical classification, on the basis of duration, season, domestic and fodder crops
- UNIT 4 : definition of soil, formation of soil with different agents
- UNIT 5 : Climatical Importance in production of crops, definition of soil types of India with a particular reference to the Southern States
- UNIT 6 : Crop rotation and different cropping schemes
- UNIT 7 : Soil tilth and tillage
- UNIT 8 : Definition of tools, instruments, implements, devices and appliances
- UNIT 9 : Tilth & Tillage, horticulture tools and implements and their functional uses
- UNIT 10: Preparation of flat seedbed, raised seedbed and pit seedbed and their advantages of growth and development of plants
- UNIT 11: Classification of soils on the basis of structure and texture
- UNIT 12 : Collection of soil and their importance, good growth and development of crops

UNIT 13 : Preparation of seedbed, digging and ploughing

UNIT 14 : visit soil testing laboratory

Sessional Assessment:

1.	Test	10 marks
2.	Assignment, Records	10
3	Viva	05
Total		25

References :

- 1 Handbook of Agriculture, (Revised Edition ICAR, New Delhi)
- 2 A History of Agriculture in India (Volume I to IV) by M S Randhava (ICAR, New Delhi)
- 3 Dictionary of Economic Plants in India by U Singh, A M Wadhvani and B M Johri (ICAR, New Delhi)
- 4 The Nature and Properties of Soil by H O Buckman and N C Brady (Eurasia Publishing House, New Delhi)
- 5 Studies of soils of India by S V Govindarajan and H G Gopala Rao
- 6 Principles of Agronomy by V T S Mudaliar (The Bangalore Printing and Publishing Company Pvt Ltd , Bangalore)
- 7 The Hamlyn Guide to plant propagation by S Mitchell and B Hayner (Hamlyn, London)

II SEMESTER B.Sc Ed.

2.4 # 2.4 1 : WORK EXPERIENCE (AGRICULTURE)

Contact Hrs per Week: 2

Exam Duration : Nil

Max Marks: 25

Sessional : 25

Terminal : Nil

OBJECTIVES: To enable students to acquire basic skills and practical knowledge in fundamentals of field crops/ vegetables/ fruits/ flowers cultivation, livestock, poultry and sericulture; To expose them to correlate the effect of various methods/practices/ treatments on the growth and development of crops, livestock, poultry and sericulture, To expose them to appreciate and explore the world of work and to inculcate the values of dignity of labour

COURSE CONTENT:

- 1 Define Soil Fertility and Soil Productivity
- 2 How different soil fertility affects crop production

3. What are the essential plant nutrients required for the growth and development of crop and their role in crop production
4. Define organic and inorganic manure (Natural and Artificial)
5. Study and uses of compost manure, leaf mould and important principles for the use
6. Preparation of compost manure and heap manure
7. Different types of manures, Farm yard manure, Compost, Green manure, Oil cakes and Crop residues
8. What is Fertilizer and their role in crop production, Nitrogenous Phosphatic and potassic fertilizers, simple, compound and mixed fertilizers
9. Time and methods of manure and fertilizer applications
10. Soils micro-organisms and their role in Agriculture.
11. What is irrigation? Sources of irrigation water and different layouts for crops
12. Study and uses of different water lifts – swinging baskets, picota, motor wheels and pumpsets Visits to nearby places
13. What is layout? Uses of different methods of efficient layout for irrigation for different crops Visit to KRS and other parks.
14. What is drainage? Drainage and its importance in crop production and types of drainages Visit to VC Farm at Mandya
15. What is Seed? Selection of seeds, seed testing and seed treatment.
16. Layout of ideal kitchen gardening and its preparation, sowing and transplanting and their importance.
17. What is Pot Culture? Study and their uses of different sizes and shapes Filling up of pots with different materials used with reasons Visit to nearby parks, visit to flower shows, gardening at Lalbagh, Bangalore and Curzon Park, Mysore

Sessional Assessment: Same as in I Semester

References:

1. Soil Fertility and Fertilizers by S L Tisdale and W L Welson (MACMILLAN)
2. Fundamentals of Irrigation and Fertilizer by Vedpal Singh (ARIC, 52, Priti Nagar, Hisar, Haryana)
3. Bio-Fertilizer in Agriculture by N S Subha Rao (Oxford & IBH Publishing Co, New Delhi)
4. Soil micro-organisms and plant growth by S Rao (Oxford & IBH Publishing Co, New Delhi)
5. Seeds Technology by R L Agrawal (Oxford & IBH Publishing Co, New Delhi)
6. Home Gardening by P P Trivedi (ICAR, New Delhi)
7. Fertilizers and Manure by A K Sacheti (NCERT)
8. Cultivation Practices for Vegetables by G S Randhawa (ICAR, New Delhi)

III SEMESTER B.Sc.Ed.

3.3 # 3.3.1 : WORK EXPERIENCE (AGRICULTURE)

Contact Hrs per Week: 2

Exam Duration : Nil

Max Marks: 25

Sessional : 25

Terminal : Nil

OBJECTIVES: To enable students to acquire basic skills and practical knowledge in fundamentals of field crops/ vegetables/ fruits/ flowers cultivation, livestock, poultry and sericulture, To expose them to correlate the effect of various methods/practices/ treatments on the growth and development of crops, livestock, poultry and sericulture, To expose them to appreciate and explore the world of work and to inculcate the values of dignity of labour

COURSE CONTENT:

- 1 Layout of farm indicating the cropping pattern, roads, bunds, water channels
- 2 Different layouts for different horticulture plants
- 3 Packaging practices of high yielding varieties of horticulture plants
- 4 packaging practices of high yielding varieties of sapota, banana, guava, mango, coconut and citrus
- 5 Packaging practices of high yield dwarf varieties of ornamental flowering and non-flowering plants in pot culture and beds like austere marigold, pink, saliva, phlox, dahlia, croton plants, visits to flower shows at Ooty, Coonur and Hesaraghatta Central Govt Horticulture Farm
- 6 Cultivation aspects of Rose Gardening
- 7 Preparation and Cultivation of lawns
- 8 Preparation aspects of participation in flower show competitions
- 9 Different aspects needed for complete gardening and flower show
- 10 Agromanical aspects of practices like weeding, hoeing, manuring, fertilizer application, nipping, staking, watering
- 11 Identification of dry land weeds, wet land weeds and garden land weed and their control
- 12 Identification of insects, pests, diseases and their control
- 13 methods of reclamation of Saline and alkaline soils
- 14 Maintenance of practical records
- 15 Multiplication of Asexual method of plant propagation like cutting, layering, grafting and budding
16. Importance and scope of fruits and vegetables preservation. Preparation of different types of fruits and vegetable products Visit to CFTRI, Mysore
- 17 Importance and scope of sericulture Cultivation of mulberry and rearing of silk worm Visit to Central Sericulture Institute, Mysore

- 18 Importance of mushroom culture and poultry farming How to grow mushroom as an occupation Visit to various poultry farms in the vicinity of Mysore
- 19 Harvesting, threshing and processing of different seeds, production and storage of crop produces
- 20 Scope and importance of multiple cropping, dry farming and social forestry

Sessional Assessment: Same as in I Semester

References:

- 1 Plant propagation by Hartman & Kester (Prentice Hall of India, New Delhi)
- 2 Weed control as a Science by C G Klingman (Wiley Eastern, New Delhi)
- 3 High yielding varieties of crops by Mahabalaram (Oxford and IBH Publishing Co , New Delhi)
- 4 Social forestry plantation by K M Tiwari and R V Singh (Oxford and IBH Publishing Co , New Delhi)
- 5 Livestock and poultry production by N Moore (Prentice Hall of India, New Delhi)
- 6 Mushroom growing in India by H Singh (Sterling Publisher, New Delhi)
- 7 Culture and Sericulture by S R Charsley (Academic Press, New York)
- 8 Preservation of fruits and vegetables by G Lal, G S Siddappa and G L Tandon (ICAR, New Delhi)
- 9 Journal on "Indian Farming" (ICAR, New Delhi)
- 10 Journal on "Crop Research" by Vedpal Singh (ARIC, 52, Priti Nagar, Hisar, Haryana)
- 11 Journal on "Indian Horticulture", (ICAR, New Delhi)

I SEMESTER B.Sc.Ed.

1.4. # WE 1.4.2 : WORK EXPERIENCE (LIBRARY SCIENCE)

Contact Hrs per Week: 2

Exam Duration : Nil

Max Marks: 25

Sessional : 25

Terminal : Nil

OBJECTIVES : To provide an understanding of the concept of the Library, its types, activities and services, To develop skills necessary for classification and cataloguing books , To develop appropriate attitudes to library and its working

4

Transaction Mode : Lecture-cum-Discussion, Observation, Library Work, Group Practice of Library skills

COURSE CONTENT:

THEORY:

UNIT 1 :

Library- its types, organisation, activities and services

UNIT 2 :

Collection development: Selection, ordering and acquisition of library materials

UNIT 3:

Library Classification –Need and purpose, Dewey decimal classification an outline study

UNIT 4: Library Catalogue-the need and purpose, types -Anglo-American Catalogue Rules- II (AACR-II)

PRACTICALS:

UNIT 5 : Classification of Books-Dewey Decimal Classification (DDC) - Cataloguing of books- Anglo-American Catalogue Rules-II (AACR-II)

Sessional Assessment :

1	Written Test -Theory	10 Marks
2	Practical- Classification of Books	05
3	Practical - Cataloguing of Books	05
4	Assignment	05
Total		: 25

References:

- 1 Ranganathan, S R Organisation of libraries Madras, Oxford University Press, 1963
- 2 Krishan Kumar Library Organisation New Delhi Vikas, 1993
- 3 Sen Gupta and Ohder Library Classification Calcutta World Press, 1971
- 4 Girija Kumar and Krishan Kumar Theory of Cataloguing, 5th Edition, New Delhi Vikas Publishing House, 1993

II SEMESTER B.Sc.Ed.

2.4. # WE 2.4 2 : WORK EXPERIENCE (LIBRARY SCIENCE)

Contact Hrs per Week: 2

Exam duration : Nil

Max Marks: 25

Session : 25

Terminal : Nil

OBJECTIVES : To provide basic understanding of the library routine activities necessary for organizing and managing a small school library, Develop the ability to use various information sources and reference tools,

Transaction Mode : Lecture cum Discussion, Individual and Group Work in Library, Field Visit

COURSE CONTENT :

THEORY :

UNIT 1 :

Circulation library materials, library membership-procedures and records, charging and discharging Systems library rules

UNIT 2 .

Maintenance library stacks-Shelf arrangement , shelf order, guides etc

UNIT 3 :

Information sources Primary, Secondary and Tertiary sources and their importance

UNIT 4 .

Reference service Need and Importance, Types of Reference of Service-Introduction to important reference works and tools

PRACTICALS.

UNIT 5: Practical work involving-Use of reference tools and finding out specific information Shelf arrangement and rectification

Sessional Assessment :

1	Written Test on Theory	10	Marks
2	Assignment	05	
3	Practicals-Use of reference tools and finding Specific information	05	
4	Practicals-Library routine work	05	
	Total	: 25	

References:

- 1 Mittal R L. Library Administration Theory and Practice New Delhi Metropolitan, 1984
- 2 Ranganathan S R Reference Service Bombay APH, 1961
- 3 Aldrich Ella V Using Books and Libraries New York McGraw Hill Book Co
- 4 Krishna Kumar Library Manual, New Delhi Vikas Publishing House, 1993

III SEMESTER B.Sc Ed.

3 3 # WE 3 3.2 : WORK EXPERIENCE (LIBRARY SCIENCE)

Contact Hrs per Week: 2

Exam Duration : Nil

Max Marks: 25

Sessional : 25

Terminal : Nil

OBJECTIVES : To provide an understanding of the importance of periodicals and its maintenance in the library, Use of computer and information technology products in the organisation, management, activities and services of the library

Transaction Mode . Lecture cum Discussion, Observation, Group work in Library, Field Visit

COURSE CONTENT.

UNIT 1 :

Periodicals/Journals- Its importance and maintenance

UNIT2:

Computer Applications in Libraries-House keeping operations-Information Storage, Retrieval and Dissemination

UNIT 3 : Internet and its use in the Library-Information Resources available on the Internet

UNIT 4 : CD-ROM technology as a information storage device- information products available on CD-Rom

PRACTICALS

UNIT 5 : Use of computers in the Library Activities and Services Use of Internet and CD-ROM Databases as the source of information

Sessional Assessment:

1	Written Test on theory	10 Marks
2	Practical Work	10
3	Assignment	05
	Total	25

References

- 1 Mittal, R L Library Administration, New Delhi Viksa Publishing House, 1993.
- 2 Sehgal, R L Information Technology for Libraries, New Delhi Ess Ess Publication, 1998
- 3 Jain, M K Library Manual A Practical Approach to Management, Delhi Shipra, 1996
- 4 Devarajan, G Information Technology in Libraries New Delhi Ess Ess Publication, 1999

I SEMESTER B.Sc.Ed.

1.4 # WE 1.4.3 : WORK EXPERIENCE (TECHNOLOGY)

Contact Hrs per Week. 2
Exam Duration : Nil

Max Marks: 25
Sessional : 25
Terminal . Nil

OBJECTIVES: To enable students to acquire basic skills in the areas of wood work, metal work and electrical work in an integrated approach, To participate in the –exploration of world of work, Experimentation with tools, materials and techniques, Work practice, to enable students to understand the concept of philosophy of work experience and its role in the overall development of school children

COURSE CONTENT:

UNIT 1 . Work Experience concept and philosophy, Historical perspective of work-oriented education Nature and scope of Work Experience in Technology area

Activities/Operations: Group Discussions, Directed Independent study

Related Theory: Role of work in Education, Concepts of Work Education in different countries, Work Education and economic development for national growth, Brief Survey of various reports on Work Education Gandhi's basic education Kothari Commission, Ishwarbhai Patel Committee and New Education Policy 1986

References SI Nos 1, 2 and 3 of the list of References at the end

UNIT 2 : WOOD WORKING TOOLS, MATERIALS AND TECHNIQUES

Activities/Operations: Making simple sketches of tools, Measuring and marking on wood, simple operations like sawing, chiseling and planing wood

Related Theory : Identification of uses of wood in day to day life situation, Properties of wood, Different types of wood, Wood as a material for technical work, Care and maintenance of tools, Equipment and work place, Proper handling of tools and safety precautions

References SI Nos 4 and 5 of the list of References at the end

UNIT 3 : JOINING AND FIXING METHODS IN WOOD.

Activities/Operations: Drilling holes in wood, Nailing on wood, Fixing screws with screw driver, Fixing wood with adhesives, Finishing wood surface with sand paper, files, etc.

Students are motivated through simple projects like making a scale, duster, etc

Related Theory : Various types of nails and screws, Art of nailing and screwing, Abrasive materials and their grades, Adhesive materials

References SI Nos 4 and 5 of the list of References at the end

UNIT 4 : METAL WORKING; MATERIALS, HAND TOOLS AND TECHNIQUES

Activities/Operations: Marking and measuring – layouts, Cutting metal with tools like (i) Snips, (ii) Chisel, (iii) hacksaw etc , Filing and grinding metals, Bending and folding metal sheets

Students are motivated through the making of simple projects like box, letter holder, tray, etc

References SI Nos 6, 7, 8 and 9 of the list of References at the end

UNIT 5 : FASTENING METHODS IN METAL WORK

Activities/Operations: Simple projects involving screw joints, Projects with riveted joints, Tightening and opening nuts, screws etc with screw drivers, spanners, wrenchers, etc

Related Theory : Common metals and alloys , Their properties and uses, Metal forms – rods, plates, tubes, sheets, etc with specifications Production methods, Identification of metals, Care and maintenance of tools, equipment and safety aspects of work and work place

References SI Nos 6, 7, 8, 9, 10 and 11 of the list of References at the end

UNIT 6 : ELECTRICITY LAB – WORK TOOLS, ACCESSORIES AND OTHER MATERIALS

Activities/Operations. Experimentation with various tools and techniques of electrical work, Drawing circuit diagram layout, Connecting electrical accessories like bulbs, holder, switches, etc , Fixing fuse carriers, plugs, etc, Joining wires and preparing wiring models on boards

Related Theory : Electricity, Types and Sources, Alternating and Direct currents, concept of voltage, current and resistance (Ohm's Law), simple calculations of work, power and energy need for safety

References SI No 12 of the list of References at the end

Sessional Assessment :

1	Practical Work including record keeping	15 Marks
2	Semester end Test	05
3	Technical reference work on Related Theory	05
	Total	25

References:

- 1 Report of various committees on work-oriented education published by Government of India, NCERT, UNESCO, etc
- 2 New Education Policy, 1986
- 3 National Curriculum on School Education, 1986
- 4 Wood working Technology by T J Hennoud (Mcknight & Mcknight)
- 5 Bench wood working by Verre and Kloud (Mcknight & Mcknight)
- 6 General Metal Work by Fevier (McGraw Hill).
- 7 Metal work by Ludwig (Mcknight and Mcknight)
- 8 Mechanical Technology by Pandya (Charotar)
- 9 Sheet Metal shop practice by Leery (American Technical Society)
- 10 Workshop Technology by Hatz Chowdhury and Bhattacharya Vols I and II (Asia)
- 11 General Metal Work by Grayshon (Van Nostrand)
- 12 Electrical Gadgets and Repairs by S R Rao (Pitambar)

II SEMESTER B Sc.Ed.**2.4 # WE 2.4.3 : WORK EXPERIENCE (TECHNOLOGY)**

Contact Hrs per Week. 2
Exam Duration : Nil

Max Marks: 25
Sessional : 25
Terminal : Nil

OBJECTIVES: To enable students to acquire basic skills in the areas of wood work, metal work and electrical work in an integrated approach, To participate in the –exploration of world of work, Experimentation with tools, materials and techniques, Work practice, to enable students to understand the concept of philosophy of work experience and its role in the overall development of school children

COURSE CONTENT.

UNIT 1 : Selection of materials, Tools and Technique for preparing wood working models/projects, Individual and group work

Activities/Operations: Repeating the skills practiced in the previous Semester, Sawing – handsaw and machine saw, planing – with more accuracy; Chiseling, Wood finishing with polish and paints, Fixing cabinet hardwares, Wood working lathe operations, Designing, Planning and

production of projects along with acquisition of skills, Group projects, Mass production items

Related Theory : Commercial sizes of wood, Market forms, Seasoning and preservation of wood, Paints and polishes for wood, Plywood and decorative laminates, Cabinet hardware – hinges, bolts, latches, locks, etc

References SI No 4 and 5 of the list of References of First Semester

UNIT 2 : Metal working, using – Hand tools, machine tools, Welding and Turning, Preparation of metal working projects – individual and group work

Activities/Operations: Cutting, drilling, hand-threading, machine-threading, metal joining by – soldering, brazing, arc-welding, spot welding, Turning metal on lathes, Set up of tools, facing, straight and taper turning, knurling and finishing, polishing on lathe Students are motivated through the making of metal products like furniture, rack, turned products, knurled products, etc

Related Theory: Selection of fastening tools like screw drivers, spanners, wrenchers – their different types, sizes and uses, Selection of different materials like rivets, washers, screws and bolts, Principles and applications of soldering and brazing, welding as process of production, Principles and applications of different welding processes, Lathe work and its role in production, Speed and feed, Depth of cut, Cutting tools

References SI Nos 6,7,8,9,10 and 11 of the list of References of First Semester

UNIT 3 : Exposure to Foundry and Forging Methods

Activities/Operations: Students observe the demonstration and record their observations

Related Theory . Heating effect of electricity, working principle of heating gadgets – their testing, insulation and earthing, Earthing materials

Reference SI No 12 of the list of References of First Semester and

13 Domestic Appliances by Bhatta (Pitambar)

14 Domestic Appliances by Anwan (Dhanpat Rai)

Sessional Assessment :

1	Practical Work including record keeping	15 Marks
2	Semester end Test	05
3	Technical reference work on Related Theory	05
	Total	25

III SEMESTER B.Sc.Ed.

3.3 #WE 3.3.3 : WORK EXPERIENCE (TECHNOLOGY)

Contact Hrs per Week: 2

Exam Duration : Nil

Max Marks: 25

Sessional : 25

Terminal : Nil

OBJECTIVES: To enable students to acquire basic skills in the areas of wood work, metal work and electrical work in an integrated approach; To participate in the –exploration of world of work, Experimentation with tools, materials and techniques, Work practice, to enable students to understand the concept of philosophy of work experience and its role in the overall development of school children.

COURSE CONTENT:

UNIT 1 : Production of articles through Work Experience Activities involving skills in the areas like wood work, metal work and electrical work using related techniques and materials (Students work individually and in group and complete 2 to 3 projects)

Activities/Operations: Preparation of teaching aids with the help of locally available materials, design and improvisation of common energy saving devices like electric heater, kerosene stove, ash stove, preparation of prototype, working models, production of simple furniture and simple material handling equipments, electrical series light set, electrical extension board, box, etc

Related Theory : Application of scientific principles in day-to-day work situations Efficiency of appliances, productivity concepts and awareness, productivity and applications through work experience activity, viz work simplification, workplace, waste utilization, etc substitution by cheaper materials, Economics of mass production, Work for education and economic development, Metal preservation – Galvanizing, enameling, electroplating, etc

UNIT 2 : Application of skills to day-to-day life situation for service and repairs

Activities/Operations: Repair and service of bicycle, Domestic electrical gadgets and appliances, water supply fittings and other items encountered in day-to-day life, Minor repair and servicing of mopeds

Related Theory : Preventive and break down maintenance, Lubricating points and methods of lubrication, Source of producing – materials for appliances, spare parts and services, Procurement procedure

Sessional Assessment :

1	Practical Work including record keeping	15 Marks
2.	Semester end Test	05
3	Technical reference work on Related Theory	05
	Total	25

I SEMESTER B.Sc.Ed.

1.3 # HPE-1 : HEALTH & PHYSICAL EDUCATION

Contact Hrs per Week : 2
Exam Duration : Nil

Max Marks : 25
Sessional : 25
Terminal : Nil

OBJECTIVES: To contribute towards the development of optimum organic health and vitality to meet emergencies, mental well being to meet the stress of modern life, adaptability to and social awareness of the requirements of group living, attitudes and values leading to optimum health behaviour, motor skills of everyday living, sports skills and muscular activity of a creative nature, moral and ethical qualities appropriate to life in a democratic society

COURSE CONTENT:

Part A : Health Education

Scope, Health and Strategies for the Future

Concept of health, inevitability of change, dangers of tolerance, the ecology of health, the health care dimension, controlling population, economics, poverty and ill-health, current health problems, problems of ageing

The Secondary School Health Programme

Defining the ends, Health Instruction, Health services, Healthful living, Historical perspective, School Health then and now, Administrative guidelines

Physical Health

Physical Activity, rest, sleep and relaxation, nutrition and growth, dental health, body structure and operation, prevention and control of diseases

Mental Health

Mental Health, Alcohol and Drugs, Smoking, Education, Family life education, the role of the school

References:

- 1 Health teaching in secondary schools by Carl W Willgoose, W B Saunders Company, Philadelphia, 1977.
- 2 School Health Programme by J S Hoog, Harper and Row
3. A problem solving approach to health and fitness by B B Johnson & Others, Holt, Rinehart and Winston, New York, 1966
- 4 Health and Safety for you by H S Diehl, McGraw Hills Book Co., New York, 1951
- 5 Health by Byrde W B Saunders Co , Philadelphia, 1981

Part B : Physical Education – Theory and Practice

Historical Perspectives & Modern Trends in Physical Education

Physical Education in primitive society, Greece, Rome, 18th Century, Germany, Sweden, America, USSR, India

Physical Education in the Secondary School Curriculum

Meaning of Physical Education, objectives, Physical-Education programme in secondary schools

Physical-Education Class Programme : Activities

Games of high organization, games of low organization, gymnastics, aquatics, rhythmic, combatives, yogasanas, track and field athletics, corrective and adaptable activities Adventure, Morning Physical Education – Calisthenics Evening Physical Education – Games Practice

References:

- 1 History of Physical Education by E Ahamed (Scientific Book Co , Patna, 1964)
- 2 Fundamentals of Sports Training by L Metyever (Mir Publications, Moscow)
- 3 Sports Training Principles by F W Dick (Legus Books, London, 1970)

Sessional Assessment:

1.	Two Tests	20 Marks
2	Assignment	05
	Total	: 25

II SEMESTER B.Sc.Ed.

2.3 # HPE-2 : HEALTH & PHYSICAL EDUCATION

Contact Hrs per Week : 2
Exam Duration : Nil

Max Marks : 25
Sessional : 25
Terminal : Nil

OBJECTIVES: To develop in the students the skill of organization of athletic meets, Training methods, General and specific warm ups, To help them comprehend – Sports medicine; prevention of athletic injuries; Exercise Physiology, Pollution effects; To enable the students to develop appreciation

for – Mental Health, Nutrition, Health Teaching Methods, Cardio-Vascular health, Evaluation in Physical Education

COURSE CONTENT:

PART A : HEALTH EDUCATION – THEORY

Mental Health Youth and Chemical Society Environmental Health Effects of Pollution, Nutrition and Health Key nutrients, Energy expenditure for everyday activities and facts to guide your food choices, Successful Health Teaching Methods Independent study, Experiment, Games and Simulation, Term Teaching, Demonstration; Audio-Visual Cardio-Vascular Health. Heart disease and prevention, Blood types and Transfusion

Environmental and Consumer Health

Environmental health, planned and preventive conservation of health, where the pollution comes from, consumer health, world health, Safe Living The state of affairs, Education for safe living, Home safety, Traffic safety, water safety, sports injuries

References

- 1 Health teaching in secondary schools by Carl W Willgoose, W B Saunders Company, Philadelphia, 1977
- 2 School Health Programme by J S Hoog, Harper and Row
- 3 A problem solving approach to health and fitness by B B Johnson & Others, Holt, Rinehart and Winston, New York, 1966
- 4 Health and Safety for you by H S Diehl, McGraw Hills Book Co , New York, 1951
- 5 Health by Byrd W B Saunders Co , Philadelphia, 1981

PART B : PHYSICAL EDUCATION (THEORY AND PRACTICALS)

Organizing and Managing Intramural and Recreational Programmes
Purpose, teachers responsibility, selection of activities, organization

Organising Interschool Programme
Nature and purpose, teaching/coaching/training teams, organization

Organisation and Administration of Physical Education
Facilities, equipments and supplies, finance, class organization and management

Track and Field Athletics . Organisation and administration of Athletic meet, warming up – General and specific, Training methods
Sports Medicine for Physical Education Athletic injuries and prevention, Therapeutic Modalities, Hazards of Sports

Exercise Physiology Muscular function in human movement, The Cardio-Vascular system and exercise.

Energetic Aids in Exercise Ageing and exercise, Bio-mechanical Principles of Sports Techniques

References:

1. History of physical education by E Ahamed, Scientific Book Co , Patna, 1964
2. A problem solving approach to Health and Fitness by B B Johnson & Others, Holt, Rinehart and Winston, NY 1966
3. Teaching physical education in secondary schools by Knapp and Leonard, McGraw Hill Series, NY 1968
4. Planning physical education and athletic facilities in schools by John Wiley and Sons, NY 1977
5. Organisation and administration of physical education by Voltmeter and Esstenges, The Times of India Press, Bombay, 1964

Sessional Assessment

1	Two Tests	20 Marks
2	Assignment	05
	Total	: 25

III SEMESTER B.Sc Ed

3 4 # IE INTRODUCTION TO EDUCATION

Contact Hrs per Week: 4

Exam Duration . 3 hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES : On completion of the course, the student teacher will

- understand the basic concepts of education, its meaning, aims and functions
- understand India's socio-cultural heritage and traditional values
- understand social structure and social change
- understand the agencies of education such as formal, informal and non-formal and also the role of society, home, school and community in socialization
- understand the characteristics of the emerging Indian society
- understand the impact of Indian national movement, its constitution, science and technology, industrialization, globalization, liberalization,

caste and class on nation's development and impact of educational thoughts of great Indian educators and social reformers

- evolve suitable educational strategies for finding solutions to the problems of the country

Transaction Mode

Lecture-cum discussion, library work, individual and group assignments, symposium in class situation, community visits, team-teaching and problem-solving session

UNIT 1 : EDUCATION: MEANING, AIMS, FUNCTIONS AND AGENCIES

Concept and Meaning of Education, Indian and Western factors influencing aims of education, Education as a process of socialization, Education as an instrument of social change, Education and social order in Indian society, Education in preservation of social and cultural heritage and traditional values, Education for development of human resources, Economics of Education – Education as investment for social needs, Agencies of Education Roles of Formal, Non-formal in emerging Indian society and Role of home, school and community in socialization of child and transmission of cultural heritage

UNIT 2 A : EDUCATION IN EMERGING INDIAN SOCIETY

Characteristics of emerging Indian society, our common cultural heritage, its compositeness, unity in diversity, richness and continuity, modernity and modern Indian society

UNIT 2 B : SOCIO-CULTURAL HERITAGE OF INDIA

Brief historical perspectives of ancient civilization, River Valley civilization, Vedic, Upanishadic Epic, Smrities, Jainism, Buddhism, Islam, Sufism and Christianity, Bhakti movements, Education in Ancient and Medieval times in India, Education in British/Colonial rule, Education in India after independence

UNIT 3 : CRITICAL APPRAISAL OF EDUCATIONAL DEVELOPMENTS RELATED TO SECONDARY EDUCATION

- a) Education in ancient and medieval times in India
- b) Education in pre-independence period (British rule), Educational provisions in Indian Constitution
- c) Education in post-independence period with reference to various committees and commissions, Secondary Education Commission (1952-53, Education Commission 1964-66, Review of 10 years School Curricular (1977-78), National Policy on Education (NPE 86) and POA (1986-92), Educational Provisions in Indian Constitution, Debora's Report (UNESCO, 1996) in relation to secondary education

UNIT 4: EDUCATION IN CONTEMPORARY INDIA AND ITS PROBABLE FUTURE

Educational thoughts of Tilak, Aurobindo, Tagore, Gandhi, Ambedkar, Sir Syed Ahmed Khan, Krishnamurthy, Impact of Mass media and

communications, modern technology and computers in Indian Society, Problems of industrialization, group behaviour, caste, class, religion, communalism, regionalism, political and economic situation, Environmental degradation and pollution, Population explosion-need for educative measures, Problems of poverty, inequality, unemployment, under privileged groups, SC/ST, minorities and also women - Rural & urban disparities, social unrest, alienation of youth, Educational provisions and Measures

UNIT 5 : VALUE PERSPECTIVES IN EMERGING INDIAN SOCIETY

Values of democracy, socialism, secularism, freedom, rights and duties of Indian citizens and their obligations, Human Rights, national and emotional integration, equity and equality in Education – Women's Education and education of the girl child, and nationalism and international understanding, promotion of values through value education in the school curriculum List of values to be promoted according to CBSE and NCERT

Sessional Work

The following activities are suggestive only

Classroom symposia/panel discussion/group discussion on

- Role of education in sustainable development
- Role of education in improving quality of life
- Role of education in achieving gender equality
- Influence of culture in education of the child
- Influence of Mass Media, Communication and Computers on the child
- Causes for erosion of values
- Educational programmes in secondary schools for creating environmental and population growth awareness
- Educational programme for value development

Sessional Assessment :

1	Two Tests	10 marks
2	Assignment	10
	Total	: 20

References:

- 1 Anand, C L and et. Al (1993) Teacher and Education in the Emerging Indian Society, NCERT, New Delhi
- 2 Coombs, Philips H., (1985) The World Crisis in Education, Oxford University Press, New York.
- 3 Delors, Jacques (1996) Learning the Treasure Within Report to UNESCO of the International Commission on Education for Twenty-first Century, UNESCO
- 4 Dewey J (952) Experience in Education, Collier Macmillan
- 5 Dewey J (1966) Democracy in Education New York Macmillan.

- 6 Gandhi M K (1956) Basic Education, Ahmedabad, Navajivan
7. Govt of India (1952) Report of the Secondary Education Commission, New Delhi Ministry of Education.
8. Govt of India (1966) Report of Education Commission, Ministry of Education, New Delhi
- 9 Govt of India, MHRD (1986, Revised 1992) National Policy of Education, New Delhi.
- 10 Govt of India, MHRD, (1992) Programme of Action (Draft) New Delhi, Aravali Printers and Publishers
- 11 Govt of India (1992) Report of Core Group on Value Orientation of Education, Planning Commission
- 12 Kneller G F (1978) Foundation of Education, New York. John Willy and Sons
- 13 Kneller George (1978) Introduction to Philosophy of Education, New York John Wiley and Sons Inc
- 14 Mani R S (1964) Educational Ideas and Ideals of Gandhi and Tagore, New Book Society, New Delhi
- 15 Mathur S S (1988) A Sociological Approach to Indian Education, Vinod Prakashan, Agra
- 16 Mukherjee K K (1972) Some Great Educators of the World, Das Gupta & Co Pvt. Ltd , Calcutta
- 17 Mukherjee S N (1966) History of Education in India, Acharya Book Depot, Baroda
- 18 Naik J P and Syed N (1974) A Student's History of Education in India, Macmillan Co , New Delhi
- 19 Naik J P (1975) Equality, Quality and Quantity The Elusive Triangle of Indian Education, Bombay Allied Publishers
- 20 NCTE (1988) Gandhi on Education, New Delhi
- 21 Salamalillah (1979) Education in Social Context, NCERT, New Delhi
- 22 Seshadri C, M A Khader, and G L Arora (1992) Education in Values-A Source Book, NCERT

IV SEMESTER B.Sc.Ed.

4 3 # UL : UNDERSTANDING THE LEARNER

Contact Hrs per Week: 4
Exam Duration : 3 hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES: On completion of this course, the student teacher will be able to

- understand the basic principles and techniques of Psychology and the implications to Education

- understand characteristics of secondary school learner, learners with special needs and the implications to Teaching and Learning
- understand the various types of differences, which exist among individuals, and select suitable teaching strategies to meet such differences
- understand the various Psychological assessment procedures
- understand adolescent learner's mental health problems and select appropriate strategies to cope with such problems

Transaction mode

Lecture-cum discussion, episode-based group activities, case studies, brain storming sessions, problem-solving sessions, panel discussion and classroom symposia

COURSE CONTENT :

UNIT 1. EDUCATIONAL PSYCHOLOGY AND THE TEACHER

Nature of Educational Psychology – The purpose of Educational Psychology in the preparation of teachers – The concepts and Principles of Educational Psychology – Using Concepts and Principles in Explanation, Prediction and Control of behaviour - Methods of studying learner's behaviour at adolescent stage observation, interview, experimentation and case study

UNIT 2 ·UNDERSTANDING ADOLESCENT LEARNER: DEVELOPMENT AND CHARACTERISTICS

Physical, cognitive, social, emotional and moral development patterns and characteristics of adolescent learners – Nature, nurture and peer factors influencing development – Adolescent period behavioural patterns in terms of motivation, aspiration, attitude and development of self-concept – implications of developmental changes for teaching-learning and curriculum – Intelligence Traditional and contemporary views of intelligence – Human intelligence (importance of Practical and Emotional intelligence) – intelligence and school success, intelligence and job success, Distinction between intelligence and achievement

Need for guidance, counseling and career education at the secondary school stage.

UNIT 3 : UNDERSTANDING DIFFERENCES AMONG LEARNERS AND LEARNERS WITH SPECIAL NEEDS

Individual differences. meaning, nature, dimensions – Factors causing individual differences: psychological, genetic and environmental – individual differences with regard to intelligence, aptitude, achievement, personality and culture – appropriate teaching-learning strategies to cater to meet learner differences.

Introduction to Psychological testing – Nature and use of psychological testing – routine assessment of abilities – psychological assessment (intelligence, aptitude, interest, attitude, personality and achievement)

Categories of exceptional learners – General concerns of teachers with regard to special needs of special learners physical impairment (visual, hearing and locomotor), developmentally delayed children, gifted and creative, and socially disadvantaged and delinquents

UNIT 4 : INTEGRATED PERSONALITIES DEVELOPMENT

Development of Personality – Meaning of personality – importance of Psycho-sexual, psycho-social and social learning theories of personality development with specific reference to adolescent stage – major determinants of personality – integrated Personality Development – Teacher's role in Integrated Personality Development

UNIT 5 : MENTAL HEALTH OF ADOLESCENT LEARNER

Concept of Mental Health and adjustments – Mental health of the adolescent learner – Factors influencing mental health – Frustration, conflicts and complexes, defence mechanism – stress management – role of school personnel for building sound mental health

Sessional Activities

The following activities are only suggestive The teacher educator can formulate more activities

- Administration of Psychological tests a personality inventory/an attitude scale/a non-verbal test of intelligence/a creative test
- Project work on child with behaviour problem/talented child/a LD child/a slow learner/a disadvantaged child
- Study of intelligence of at least 5 school children

Sessional Assessment :

1	One Test	10 Marks
2	One Assignment	05
3	Presentation	05
	Total	: 20

References:

- 1 Bernard, P H (1970) Mental Health in the Classroom, N Y McGraw Hills
- 2 Levin, J R and Allen, V L (1976) Cognitive Learning in Children Theories and Strategies, NY Academic Press

3. McShane, J (1991) Cognitive Development An Information Processing Approach, Oxford Basil Blackwell
4. Rothstein, P R (1990) Educational Psychology, N Y McGraw Hills
5. Torrance, E O (1970) Encouraging Creativity in the Classroom
6. Torranu E P and Roberts D S (1965) 'Mental Health and Achievement' New York, John Wiley and Sons
7. Medin Dougl L (1996) Cognitive Psychology (2nd Edn), NY Harcourt Brace College Publishers

IV SEMESTER B.Sc.Ed.

4.4 # IPS : INSTRUCTION - PROCESS AND SKILLS

Contact Hrs per Week: 4
Exam Duration : 3 hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES: On completion of the course the student teacher will be able to

- demonstrate his/her understanding of the role of a teacher at different phases of instruction
- write instructional objectives for teaching of a topic
- demonstrate his/her understanding of different skills and their role in effective teaching
- use appropriate instructional materials for effective classroom transaction
- use instructional skills effectively

Transaction Mode

Lecture cum discussion, demonstration through audio video mode, individual and group assignments, problem solving sessions, team teaching, individual and group practice of skills

COURSE CONTENT:

UNIT 1 : INSTRUCTIONAL PROCESS

Teaching, Learning and Instruction – meaning, assumptions, principles and functions, Teaching as an art and a science, Direct and Indirect teaching, The General Model of Instruction – Pre-active, interactive and post-active phases and teacher's role in them

UNIT 2 : PLANNING FOR INSTRUCTION

Importance of careful planning, Elements of planning, Establishing goals and objectives; Importance of instructional objectives in lesson planning and Taxonomy of instructional objectives - cognitive, affective and psychomotor; Characteristics of instructional objectives (Mager's criteria), Competency-Based Instruction, Task Analysis, Relationship between objectives and teaching strategies, Formats and components of a Lesson Plan

UNIT 3 : CLASSROOM SKILLS-I

Teacher skills in classroom instruction – an analysis

Introducing a lesson/topic the importance of motivation in teaching, techniques of introducing a lesson to provide motivation, meeting the motivational needs of the disadvantaged learners, movement from familiar to unfamiliar, introduction of dramatic element, strategies for sustaining attention and interest

Questioning its various forms thought provoking, interpretative questions, questions to measure analytical ability, application ability, rephrasing, question to test judgment ability, synthesis ability, probing questions, motivation question, suggestions for handling pupil's questions and promoting pupil – pupil interaction in diverse context

Explaining. Purpose of explaining in classroom, importance of link words, clarity, continuity, relevance to the content, using beginning and concluding statements, covering essential points Types of explanations – Interpretive, Descriptive, Reason-Giving

Illustrating with Examples. simple, interesting and relevant to the points being explained Inductive and deductive approach to illustrating – EGRULE and RULEEG

Use of Aids. relevant to content, appropriate to pupils level, proper display and appropriate use General guidelines

Closure of lesson. meaning, importance and ways of achieving closure of a lesson

UNIT 4 : CLASSROOM SKILLS-II

Reinforcing: Principles of reinforcement, varieties of reinforcers and their use – positive and negative, verbal and non-verbal: guidelines for use of reinforcement

Stimulus Variation: Meaning and need for stimulus variation, Components – movement, gesture, change in voice, stress, focusing, change in interaction pattern, pause, pupil participation and aural and visual aids

Classroom Management Concept and components, creating congenial learning climate in the classroom Verbal and non-verbal techniques of Classroom management

Use of Blackboard: Blackboard as an instructional aid, Blackboard writing and drawing, suggestions for effective use

UNIT 5: SKILLS IN INSTRUCTIONAL CONTEXT

Relationship between teaching skills and the phases of teaching, Relationship between teaching skills and methods and strategies of teaching concept learning, principle learning-inductive, deductive, and inquiry

Sessional Work :

- study of instructional practices with reference to use of classroom skills
- classification of instructional objectives of a lesson under domains and levels
- writing instructional objectives for different content categories
- identifying skills incorporated in a lesson plan and judging their appropriateness and adequacy
- practice of skills in a simulated situation

Sessional Assessment

1	Two tests	10 marks
2	Planning & Practice of Skills	10
	Total	: 20

References

- 1 Allen, Dwight and Kevin, Ryan (1969) Micro Teaching, Addison Wesley Pub, Co London
- 2 Austin, F M (1961) Art of Questioning in the Classroom, University of London Press Ltd , London
- 3 Bloom, B S , Englehart M D, Furst E J, Hill W H and Khrathwohl, D R (1956, 1964) Taxonomy of Educational Objective Handbook 1, Cognitive Domain, Handbook 2, Affective Domain, Longman London
- 4 Buch, M B and Santharam M R (1972) Communication in Classroom, CASE, Faculty of Ed & Psy M S Univ Baroda
- 5 Davis, Irork (1971) The Management of Learning, Mc Graw Hill, London
- 6 Jangira N K and Ajit Singh (1982) Core Teaching Skills The Microteaching Approach, NCERT, New Delhi
7. Nagpure, V (1992) Teacher Education at Secondary Level, Himalaya Publishing House, 'Ramdoot', Dr Balerao Marg, Girgaon, Bombay 400 004
- 8 Passi, B K (1976) Becoming better teacher Micro-teaching Approach, Sahitya Mudranalaya, Ahmedabad

- 9 Sharma, R A (1983) Technology of Teaching, International Publishing House, Meerut
- 10 Kumar, K L (1996) Educational Technology; New Age International (P) Ltd Publishers, New Delhi
- 11 Singh, L C Microteaching Theory and Practical, National Psychological Corporation, Agra

V SEMESTER B.Sc.Ed.

5.1 # PTL : PSYCHOLOGY OF TEACHING AND LEARNING

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES: On completion of this course the student teacher will be able to

- understand the various psychological principles and approaches to learning and teaching and develop the essential competencies to apply them in teaching-learning situations
- understand the different factors related to learning process
- understand the dynamics of group, qualities of leadership and the management of time, task and resources
- understand the higher-order thinking process involved in human learning and plan their teaching to help learners, think

Transaction Mode

Lecture-cum-discussion, episode-based group activities, case studies, brain storming sessions, problem-solving sessions, panel discussion and classroom symposia

COURSE CONTENT:

UNIT 1: PSYCHOLOGY OF TEACHING AND LEARNING

Psychology of teaching and learning from different perspectives
behaviorist, cognitivist and humanist – Teaching as a process of interaction with learners, communicating and decision-making – Determinants of effective teaching.

UNIT 2: TEACHING-LEARNING PROCESS

Concept and nature of teaching and learning – Relation between teaching and learning – Teaching-learning outcomes, Learning of concept, skill, attitude and values

Process of learning through association (trial-error and success, operant conditioning) – through perceptual organization (cognitive field theory) – the information-processing framework for learning (Sternberg,) – learning constructivism (Piaget, Vygotsky) and social learning (Bandura).
Teaching Approach Ausubel's reception learning and expository teaching (advance organizers), Bruner's discovery learning, Inductive method – designing instruction in accordance with Gagne's hierarchy of learning

UNIT 3: FACTORS AFFECTING ACQUISITION OF LEARNING: MEMORY AND THE TRANSFER OF LEARNING

Characteristics of the learner, Motivation – importance of motivation in learning – types of motivation – Maslow's hierarchical needs – motivational techniques in classroom learning – Achievement motivation – Interest of the learner – Home and school related factors – Factors related to learning materials – Methods of learning
Laws of Learning Laws of motivation, laws of feedback/reinforcement, laws of transfer and laws of repetition
Memory – Cognitive Processing – Short-term Sensory Storage, STM and LTM, Forgetting – Types and causes, Measures for improving retention
Transfer of Learning Traditional and contemporary views of transfer – Teaching for transfer

UNIT 4 CONCEPT LEARNING, PROBLEM SOLVING, CRITICAL THINKING AND CREATIVITY

Teaching and Learning about concepts – Methods for Teaching Concepts, Problem solving – Aspects of Problem-solving (promoters and constraints of problem solving) – steps involved in problem-solving
Critical Thinking – Importance of critical thinking in Education – Developing critical thinking among learners – Role of the teachers
Creativity Understanding creativity – mental and emotional attributes of creative individuals – identifying creative potential – creativity in teaching and learning – schools as centers of creative activities – Fostering creativity among learners

UNIT 5: GROUP DYNAMICS, LEADERSHIP AND CLASSROOM MANAGEMENT

Group dynamics Relationship of the individual to the group – the basic interaction styles (co-operation, competition, accommodation and assimilation) – Group cohesiveness – Social roles and responsibilities – Sociometry – Teacher's role as a leader
Leadership Need, types and qualities of leaders – Developing leadership qualities among adolescent learners
Classroom Management Creating positive classroom climate – Management of resources (human and material), task and time

Sessional Work

Critical analysis of classroom instruction in the light of the understandings developed in Units 2 & 3

Any one experiment on learning – division of attention, memory, transfer of learning

Sessional Assessment :

1	One Test	10 Marks
2	One Assignment	05
3	One presentation	05
	Total	: 20

References:

- 1 Bernard, S W (1972) Psychology of Learning and Teaching, NY Harper and Row
- 2 Biggs, John B (1987) Mental Process of Learning, Sydney Prentice Hall
- 3 Bloom, B S (1982) Human Characteristics and School Learning, NY McGraw Hills
- 4 Gagne', R M (1985) The Cognitive Psychology of School Learning, Boston Little Brown and Co
- 5 Evans, E D (1976) Transition to Teaching, NY Holt, Rinehart and Winston
- 6 Herman, T M (1977) Creating Learning Environments The Behavioural Approach to Education, Boston Allyn and Bacon
- 7 Joyce, Bruce and Marsha Weil (1985) Models of Teaching, New Delhi Prentice Hall
- 8 DeCecco, J P (1970) Psychology of Learning and Instruction Educational Psychology, New Delhi, Prentice Hall
- 9 Hergenhaun, B R OlsomH Mathew (2001) An Introduction to Theories of Learning (6th Edn), NJ Prentice Hall Inc
- 10 Dandapani, S (2001) Advanced Educational Psychology (2nd Edn), New Delhi Anmol Publications Pvt Ltd.
11. Parson D Richard (2001) Educational Psychology – Canada : Wadsworth, Thomson Learning

5.2 # CE : CURRICULUM AND EVALUATION

Contact Hrs per Week: 4
Exam Duration : 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES: To develop in the students the understanding of nature, principles, foundations and organization of curriculum, To develop the ability to evaluate school curriculum and some curricular projects, To develop understanding of principles and techniques of evaluation, To build in the students the ability to design achievement tests in school subjects and interpret test data

COURSE CONTENT:

PART A : CURRICULUM

UNIT 1 : Curriculum : Concept, Foundations and Principles

The meaning of curriculum, curriculum and related concepts, foundations of curriculum, knowledge, society and culture, learner and nature of learning, steps involved in curriculum construction (different models)

Components and Organisation of Curriculum Objectives – meaning, types, principles, taxonomy, validation and sources Content meaning and kinds of content, criteria for selection and organization of content, principles of organization – logical and psychological, Learning activities – meaning, criteria for selection and organization of learning activities

UNIT 2 :

Curriculum Evaluation – principles, purposes, and procedures of curriculum evaluation -, critical study of existing school curriculum, Review of curriculum projects in some of the school subjects A review of National Curriculum Framework for elementary and secondary education

PART B : EVALUATION

UNIT 3 : Educational Evaluation – An overview, Measurement – Historical development and present status, characteristics of educational measurement – quantitiveness, constancy error, indirectness and relativity, meaning of testing; measurement; evaluation, assessment, appraisal – role of evaluation formative and simulative -, kinds of evaluation – norm-referenced and criterion referenced -, continuous assessment, internal and external assessment

Instructional Objectives and Evaluation – Importance of defining objectives, characteristics of precise instructional objectives (PIO), functions of PIO in good measurement

UNIT 4 : Evaluation Techniques and Tools, Evaluation of Scholastic Areas written and oral tests, achievement and diagnostic tests, essay and objective tests, individual and group tests, teacher-made and standardized tests characteristics of a good measuring instrument – objectivity, reliability, validity, discrimination, economy in administration, scoring and interpretation Construction and standardisation of an Achievement Test – Planning the achievement test, Writing of test items, essay/open-ended, short answer, objective types, their relative merits and limitations suggestions for framing of these test items; assembling the test, criteria for arrangement of items; preparing directions, preparing the test sheet and the scoring key Evaluation of co-scholastic and social and personal qualities Observation – technique of observation, Rating Scale – types, check list, anecdotal records, interviews – type, sociometry, sociogram, attitude scale, interest inventory, self reporting techniques, self evaluation and peer appraisal

UNIT 5 : Analysis and interpretation of test data Representation of data to facilitate interpretation – tabular and graphical, measure of central tendency, variability, skewness and kurtosis – measures, types, estimation and interpretation, derived scores – importance, types and uses, correlation and coefficient of correlation – meaning types and uses, use of test data – placement and promotion, homogeneous grouping, diagnosis and remediation, motivation and curriculum evaluation Marking and grading system – issues and concerns

Sessional Assessment :

1	One Test	10 Marks
2	One Assignment	10
	Total	: 20

References:

- 1 Handbook on Formative and Summative Evaluation of Student Learning by B S Bloom and J T Hastings (McGraw Hill)
- 2 Stating Behavioural Objectives for Classroom Instruction by N E Gronlund (MacMillan)
- 3 Constructing Achievement Tests by N E Gronlund (Prentice Hall)
- 4 Standardised Tests in Education by N A Mehrens and I J Lehmann (Holt, Rinehart and Winston)
- 5 Introduction to Educational Measurement by V H Noll, D P Scannell and R C Craig (Houghton Mifflin Co , Boston)
- 6 Measurement and Evaluation in Psychology and Education by R L Thorndike and Elizabeth, John Wiley.
- 7 Curriculum Planning for better Teaching and Learning by J G Saylor and W Alexander (Holt, Rinehart and Winston)
- 8 Curriculum Development – Theory and Practice by T Hilda (Harcourt, Brace and World Inc)
- 9 National Curriculum Framework for Elementary and Secondary Education – NCERT, 1988

- 10 National Curriculum Framework for Elementary and Secondary Education – NCERT, 2000
- 11 Measurement and Evaluation in Education by Ekel
- 12 Das R C et al (1984) Curriculum and Evaluation New Delhi, NCERT
13. Garret H E (1971) Statistics in Psychology and Education, Bombay, Vakils, Feffer, Simon (Pvt) Ltd
- 14 Norris, N (1990) Understanding Educational Evaluation, Kegan Pal Ltd
- 15 Popham, W J (1993) Educational Evaluation, Allyn and Bacon, New York

VI SEMESTER B.Sc.Ed.

6.1 # IMMS : INSTRUCTIONAL MEDIA, MATERIALS AND STRATEGIES

Contact Hrs per Week : 4

Exam Duration: 3 Hrs

Max Marks : 100

Sessional : 20

Terminal : 80

OBJECTIVES: On completion of the course, the student teacher will

- understand the process of instructional communication
- understand and appreciate the use of different types of instructional media and materials
- prepare and use appropriate instructional material for effective classroom transaction
- understand and use the techniques for individualized and group instruction

Transaction Mode

Lecture cum discussion, demonstration through audio video mode, individual and group assignments, problem solving sessions, team teaching, individual and group practice of skills

COURSE CONTENT:

UNIT 1: COMMUNICATION PROCESS

Concept and purpose of communication, the communication process, components and types of theories of communication, role of media in communication process, teaching as interpersonal communication, factors affecting communication, Dale's cone of Experience and its role in teaching-learning

UNIT 2: PRINT AND AURAL MEDIA AND MATERIAL

- a) Print Medium, Concept, types, functions, development and effective use of text book, work book, case study and distance education material.
- b) Aural Medium Effective oral communication in classroom, Influencing factors and guidelines
Broadcast/Recorded Audio programmes – Formats, script writing, production and use in classroom Hardware guidelines for use

UNIT 3: VISUAL AND AUDIOVISUAL MEDIA AND MATERIAL

- a) Non projected visuals Concept, types, functions, development and effective use of chart, poster, map, graph, model and specimen
- b) Projected visuals Concept, types, functions, development and effective use of OHP transparency, slide and filmstrip
- c) Audio visual Medium Instructional Value and guidelines for use of films, TV, Video, Computer and Multimedia CD

UNIT 4: AUTO INSTRUCTIONAL STRATEGIES

Individualised Instruction – meaning, need and principles, Techniques of individualization of instruction – meaning, importance and organization of Computer Assisted Instruction, Personalised system of instruction, self-paced activity Learning activity packages Learning centers, mini courses, modular instruction, programme instruction

UNIT 5: GROUP BASED STRATEGIES

Meaning, scope, advantages and guidelines for organising role play, simulation, games, group discussion, debate, quiz, team teaching, tutorial, project and field trips

Sessional Work :

- Preparation of at least three teaching-learning aids from those mentioned under Unit 2
- Planning and preparation of an audio programme for secondary level (group work)
- Review of a self-instructional material
- Evaluating an instructional aid/programme
- Developing a plan for using a TV/Video Programme

Sessional Assessment :

1. Two Tests	10 marks
2. Practical on preparation of materials	10 marks
Total	: 20

References:

- 1 Bhatta B D, Sharma, S R (1992) Educational Technology – Concept and Techniques, New Delhi Kanishka Publishing House.
- 2 Dale Edgar (1961) Audio-visual Methods in Teaching (Revised) Hoft, Rinehart and Winston, New York
- 3 Das R C (1993), Educational Technology – A Basic Text, Sterling Publishers, New Delhi
- 4 Kumar, K L (1996) Educational Technology, New Age International (P) Ltd Publishers, New Delhi
- 5 Haas K B and Packer H Q, Preparation and use of Audio Visual Aids, Prentice Hall Inc ,New York
- 6 Sharma, R A (1983) Technology of Teaching, International Publishing House, Meerut
- 7 Sampath K (1981) Introduction to Educational Technology, Sterling Publishers, New Delhi
- 8 Venktaiah N (1996) Educational Technology, New Delhi APH Publishing Corporation

VI SEMESTER B.Sc.Ed.

6 2 # MT : MODELS OF TEACHING

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max. Marks: 100

Sessional: 20

Semester: 80

OBJECTIVES· On completion of the course, the student teacher will be able to

- understand the nature and functions of different models of teaching
- acquire necessary competence in their use
- plan, implement and evaluate the activities in the various models of teaching

COURSE CONTENTS.

THEORY

UNIT 1 : INTRODUCTION TO MODELS OF TEACHING

Need for alternate strategies, Models of teaching (information processing, personal, social and behavioural modification), Meaning, characteristics, functions, sources and elements · focus, syntax, social system and support system of a model, Model Based approach to teaching

UNIT 2 · INFORMATION PROCESSING MODELS – I

Information processing outcomes, process skills and content, kinds of process skills – observation and inference, generalizing, prediction, explanation and

hypothesizing, kinds of content – facts, concepts and generalization Goals, rationale, sources and elements of the following models and their applications in transacting school curriculum

Scientific Inquiry

Inductive Thinking

Inquiry Training

Scientific Inquiry

UNIT 3 : INFORMATION PROCESSING MODELS – II

Goals, rationale, sources and elements of the following models and their applications in transacting school curriculum

Concept Attainment

Advance Organiser

Synectics

UNIT 4 : PERSONAL AND BEHAVIOUR MODIFICATION MODELS

Goals, rationale, sources and elements of the following models and their applications in transacting school curriculum

Non-directive Teaching

Contingency Management

Mastery Learning and

Social Learning (Bandura)

UNIT 5 : SOCIAL INTERACTION MODELS

Group Investigation, Jurisprudential, Role Playing, Social Simulation

Goals, rationale, sources and elements of the following models and their applications in transacting school curriculum

PRACTICUM

Students would practise at least one model from each family models of teaching vide units 2 and 3 in a simulated teaching situation in small groups

Sessional Assessment.

1	One Test	10 marks
2	Simulated Teaching	10
	Total	: 20

References:

- 1 Toward a Theory of Instruction by J Bruner (Harvard University Press, Cambridge, 1966)
- 2 Models of Teaching by B Joyce and M Well (Prentice Hall of India, New Delhi, 1996)
- 3 Conceptual Learning and Development A cognitive view by H Klausmeir, E Ghatala and D Frayer (Academic Press, New York, 1974)
- 4 Models of Teaching · Report of three phase study of CAM and IIM by Passi B K AND OTHERS.

- 5 Models of Teaching by Bhattacharya S P
- 6 Inquiry Training Model of Teaching by Passi B K and others, 1987

VIII SEMESTER B.Sc.Ed.

8.2 # SESPS : SECONDARY EDUCATION IN INDIA: STATUS, PROBLEMS AND STRATEGIES

Contact Hrs per Week: 4
Exam Duration : 3 Hrs

Max Marks: 100
Sessional : 20
Terminal : 80

OBJECTIVES · On completion of the course the student teachers will have

- An understanding of the concept, objectives and nature of secondary education
- The ability to examine the status of development of secondary education in India after Independence
- An understanding of the interventions required to solve the problems and issues of imparting quality education in secondary schools
- the ability to identify the problems and issues of secondary school teachers

Transaction Mode

Lecture-cum-discussion, Group discussion, Panel discussion, Seminar, Brain Storming, Group Work, Library work and School visits

UNIT 1 : NATURE, PURPOSE AND PHILOSOPHY OF SECONDARY EDUCATION

Philosophy of secondary education, Concept of secondary education, aims and objectives of secondary education, linkages with elementary and senior secondary stage, Scope and nature of secondary education, place of secondary education in the education system, functions of secondary schools

UNIT 2 : STATUS OF SECONDARY EDUCATION

Review of secondary education committees and commissions

Present situation – access, structure, national curriculum framework, facilities for qualitative improvement, policy change in regard to secondary education as envisaged in revised NPE/POA (1992) content and process of education at secondary stage

UNIT 3 : IMPARTING QUALITY EDUCATION AT SECONDARY LEVEL: PROBLEMS AND STRATEGIES

Problems/challenges/strategies/interventions in relation to access, achievement, equity and quality improvement, Problems of education of girls,

disadvantaged groups (SC/ST, and other backward communities including minorities) and disabled, and interventions to solve the problems, Problems related to curriculum transaction with special reference to culture-specific and contextual transaction, examination reforms, administration, financing of secondary education and interventions to solve the problems

UNIT 4 . PROBLEMS AND STRATEGIES OF ALTERNATIVE SCHOOLING AT SECONDARY STAGE

Problems of out of school children, concepts of alternative schooling and non-formal education, curriculum and teaching learning strategies, Role of NGOs in Non-formal Education, Improving the internal efficiency of the system, initiatives by the govt, Teacher recruitment, their working condition and morale, problem of teacher training, Strategies for enhancing learning achievement of secondary students, Curriculum reform, Open Schooling National and State Open Schools

UNIT 5 . THE SECONDARY SCHOOL TEACHER

Issues related to professionalism – code of professional ethics for Teachers, Issues related to teacher motivation, factors effecting teacher motivation, Job/working condition related issues, Job satisfaction, Issues related to teacher education and training, Issues related to teachers role performance and role perception-role ambiguity, role conflict, role overload, role stress and role strain, accountability of teachers, Role of teacher organizations, unions and associations in the development and improvement of quality education at the secondary level

Sessional Work

- Preparing status report on secondary education in a chosen block/district with reference to enrolment, equity and achievement
- Preparing a report on the existing status of the teachers, method of recruitment and salary structure
- Conducting a survey of secondary schools on the chosen area on the causes of under achievement and suggest improvement thereof
- Visits to different types of secondary schools and preparation of school profiles
- Conduct interview with teachers/students/parents of different schools and prepare a report on problems of secondary education
- Preparation of status report of performance of teachers in contextual curriculum transaction
- Observation of in-service teacher education programme at secondary level and preparation of a report.
- Identification of committed teachers and preparing of their profiles.
- Visit to alternative education centres at secondary level and preparation of a report
- Survey of educational needs of disadvantaged/disabled

Sessional Assessment :

1	One Test	10 marks
2	Sessional Work	10
	Total	: 20

References:

- 1 Chopra, R K (1993) Status of Teachers in India, NCERT, New Delhi
- 2 Govt of India (1953) Report of Secondary Education Commission, New Delhi
- 3 Govt. of India (1966) Indian Education Commission (1964-66) Report New Delhi
- 4 Govt of India (1986/1992) National Policy of Education, 1992, Modification and their POA's MHRD, Deptt of Education
- 5 Kundu, C L (Ed) (1984) Indian year Book on Teacher Education, Sterling Publishers Pvt Ltd , New Delhi
- 6 Malhotra, P L (1986) School Education in India Present status and Future Needs, NCERT, New Delhi
- 7 NCERT (1997) Code of Professional Ethics for Teachers
- 8 NCTE (1998) Competency Based and Commitment Oriented Teacher Education for Quality School Education, Pre-service and in-service programme, New Delhi
- 9 NCTE (1998) Policy Perspectives in Teacher Education, New Delhi
- 10 Peters, R S (1971) Ethics and Education, George Allen Unwin Ltd London
- 10 Singh, R P (Ed) Teacher Training in India-Looking Ahead Federation of Management & Educational Institutions, New Delhi

VIII SEMESTER B.Sc.Ed.

8.3 # SM . SCHOOL MANAGEMENT

Contact Hrs per Week: 4

Exam Duration : 3 Hrs

Max Marks: 100

Sessional : 20

Terminal : 80

OBJECTIVES : On completion of the course the student-Teachers will

- understand the concepts and basic principles of school management
- understand concept of institutional planning
- understand time and resource management
- identify factors conducive to the effective management of various school activities
- understand the concept of discipline and classroom management

Transaction Mode

Lecture-cum-discussion, group work, school visits, brain storming exercises, seminar, extension, lecture, analysis of field data/situational analysis

COURSE CONTENT:

UNIT 1: SCHOOL MANAGEMENT – BASIC CONCEPTS

Distinction between Administration, Management and Supervision, process of school management planning, organizing, control, decision making, communication, coordination, financing and evaluation, leadership, styles and types, Qualities and responsibilities of head, principles of management

UNIT 2: INSTITUTIONAL PLANNING

Institutional Planning concept, important steps and areas of institutional planning, role and functions of headmaster in institutional planning, preparation, implementation and evaluation of institutional plan, community participation in institutional planning, lab area approach, catchments area, mobilization of the community resources/support for school improvement.

UNIT 3: TIME AND RESOURCE MANAGEMENT

Time Management – time table – its nature, types, principles to be followed for framing an ideal time table, factors affecting preparation of school time table, calculation of teacher workload, staffing pattern, Management of Material Resource Management of Human resource – need for good inter-personal relations, leadership qualities of teachers, techniques of establishing good human relations, teacher-taught, teacher-teacher, head-teacher-teacher, teacher-management/ administration, teacher-parents relations, Teacher welfare services, job satisfaction of the teachers, staff associations, grievance redressal mechanism, opportunities for professional development of the teachers, school and community relationship

UNIT 4: MANAGEMENT OF SCHOOL ACTIVITIES

Admission, classification and promotion of students, Maintenance of school records, Management of Classroom teaching-learning activities, Managing educational tours, field trips, community services, NCC and other auxiliary services; School associations – Students Council, NCC, Scouts and Guides, Managing the Examination/evaluation – class tests, unit tests, weekly test, monthly tests, terminal tests, half yearly and final examination, preparation of cumulative records, organizing co-curricular activities and competitions such as drama debates, recitation, community singing, children competitions in arts, creative writing, sports and athletics, literacy cultural, scientific and recreational activities, managing laboratories and organizing school assembly

UNIT 5: DISCIPLINE AND CLASSROOM MANAGEMENT

Concept and importance of discipline, techniques of maintaining discipline in school, concept and components of classroom management, individual differences, group dynamics.

Sessional Work

Review the school timetable planning and its effectiveness towards attaining academic expectations laid by National Curriculum Framework

Preparation of a plan of action to be implemented during the next three years for improving the functioning of school

Suggesting plan of effective management of time, building and resources (Library, laboratory, computers)

Project work on analyzing good and weak points of school management in private, Government, large sized and small sized classroom

Sessional Assessment :

1	One Test	10 Marks
2	Sessional work	10 Marks
	Total	: 20

References:

- 1 Alka, Kalra (1977) Efficient School Management and Role of Principals APH Publishing Corporation, New Delhi
- 2 Bagley, Classroom Management, MacMillan, New York
- 3 Bhatnagar, R P and Verma, I B (1978) Educational Administration, Loyal Book Depot, Meerut
- 4 Bhatnagar, R P and Agarwal, V (1986) Educational Administration and Management, Loyal Book Depot, Meerut
- 5 Bhatnagar, R P and Verma I B (1978) Educational Supervision, Loyal Book Depot, Meerut
- 6 Buch, M B Institutional Planning for Educational Improvement and Development, NCERT, New Delhi
- 7 Buch, T (et al) (1980) Approaches to School Management, Harper & Row Publishers, London
- 8 Campbell, R F , Corbally, J E and Nystrand, R O (1983) Introduction to Educational Administration, (6th ed), Allyn and Bacon, Inc , Boston
- 9 Blumberg, A & Greenfield, W (1986) The effective principal, Allyn & Bacon
- 9 Govt of India (1992) Programme of Action, MHRD, New Delhi
- 10 Gupta, S K and Gupta S (1991) Educational Administration and Management, Manorama Prakashan, Indore
- 11 Hardy, C & Altken, R (1986) Understanding schools as organizations, Panguing, London
- 12 Johnston, J N (1981) Indicators of Education of Systems, London, Kogen Page, IIEP, Paris
- 13 Khan, M S (1990) Educational Administration, Asia, Publishing House, New Delhi

- 14 Kochhar, K S (1982) Secondary School Administration, Sterling, New Delhi
- 15 Mohanty, J (1993) School Management, Administration and Supervision, Cuttack Takshyashila
- 16 Naik, J P (1970) Institutional Planning, Asia Institute for Educational Planning and Administration, New Delhi
- 17 Sushi, T et al (1980) Approaches to school management, London, Harper & Row
- 18 Vashist, Savita (Ed) (1998)/Encyclopedia of School Education and Management, New Delhi, Kamal Publishing House
- 19 Safaya, R and Shaida, B D (1977) Administration and Organisation, Dhanpat Rai and Sons, Delhi
- 20 Sidhu, S .K (1982) School organization and administration, Sterling Publishers, New Delhi

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